

DRAGON USER

International edition

The independent Dragon magazine

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July 1983

**Brain-teasing
software
reviewed**

**Processing
Sandy**

**Input
and
output
examined**

**Printers
compared**

**Play Golf,
Brick Out,
Dragon Blitz**

**Interview: Tony Clarke
of Dragon Data**

**WIN
Powertran
Electronics'
Micrograsp
robot**



DRAGON USER



July 1983

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How to submit articles

The quality of the material we can publish in
Dragon User must mean it is a very good
extent, depends on the quality of the
articles that you can make with your
Dragon. The 16 open-10 computers are
designed to be the most useful with a powerful version of
Basic but with very little documentation.

Every one of us who use a Dragon will be
able to develop new ideas and quickly about
every day. To help other Dragon users keep
up with the speed of the developments
result of all the issues that we make the
necessary for — that means writing a down
and sending it to us in return.

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well be of effort.

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Editorial

DRAGON DATA PLANS to move upmarket this year, launching two bigger machines,
well built, if not an even stronger position to attack the educational market. This is one
area in which the Conservatives are part notably proud of their achievements, through the
microelectronics scheme. But how justified is their pride? And more importantly for
Dragon Data, how far and open to attack is the market?

In fact, the Conservative records tend to show that they are willing to acknowledge a lot
of their achievements are achieved when they themselves, many school children are still
never getting over a computer, or are finding that their interests are not being matched by
the Conservative policies. So far, most secondary schools have no more than one
micro, and half the UK's primary schools are still left without a machine. The scheme's
declared aim is to provide schoolchildren with the instruction and hardware to prepare
them for the future. Obviously the Conservatives have a low expectation of schoolchildren
even a survival — and high hopes of a fall in the birthrate.

The shortage of machines is compensated by divided government responsibility. The
micro-in schools scheme is sponsored by the Department of Industry but the actual
use of the machines is more the responsibility of the Department of Education and
Science. The junior Education Minister acknowledged this spring that it was too good
having the computers without the right software and admitted that a great deal more was
to be needed. He also admitted that not all local education authorities had been able to
benefit, in most instances. The Industry Department's response was to add more school
robots to be left by hardware that it is willing to subsidise.

The results in schools scheme is also put forward as a prime example of what the
Conservatives call enlightened public purchasing, or what others call buying British.
Doubtless, Cive Sinclair has some unpleasant opinions about how enlightened the
scheme was when it excluded his machines. And Dragon Data, by most accounts the third
most successful British home computer manufacturer, is still excluded. For a party which
professes to believe in the virtues of the free market, the Conservatives are remarkably
keen to exclude in high priority purchases from above, while opening up a popular
market from below.

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Software range increases

SMALL SOFTWARE users continue to make the most of the Dragon's success.

Devon-based MBT Carcut has a new offering aimed at desk-based business software — running so far on Premier Microsystems drives.

At the other end of the list — on the list of 14,000 off the world coast of Scotland — Hamlyn Software is adding more galleys to its range. Next in line is *Scanner 10* which contains the elements of both scanner and advertising galleys.

And a new company, Sely Software, is offering advertising rooms on its software. Its first release is *Film Products* which encompasses all the areas and illustrations of attempting to make a film.

Microcare offers to double memory

AN EXTRA 32K of memory for about £25 is the promise Microcare is making to Dragon 32 owners.

The company is offering an internal modification which will upgrade users' memory at a cost of about £25, including a labour implementation.

This modification will only work on some machines — Microcare says most the company needs to know your

Dragon's serial number to check suitability.

As a later stage offer users will be offered a different modification.

One snag is that the customer will be voided by the modification.

This service is available by post and Microcare expects to have retail machines in a week. The company can be contacted on (02043) 3895.

Wait continues for OS9 system

DRAGON OWNERS waiting to get to grips with the OS9 operating system will have to wait more than expected, and not just the end of summer.

The first device available from Dragon Data run its own disk operating system — OS90 will not be available until September when the Dragon 64 is on sale.

Dragon Data had intended to offer a boxed design for 32 owners going from 64K of RAM. These upgraded machines would then have run OS9.

Now the company intends to offer a CPU design in September going from 64K of RAM and two ROMs. At that same time service agents will change the bottom half of the Dragon's motherboard adding an HD32 interface.

In effect this results in a Dragon 64 which can run OS9 on the device already available.

Putting on its upgrade hat and yet been dropped, but it is likely to cost over £100. The Dragon 64 is expected to cost less than £275.

Tony Clarke, the company's managing director, said that software compatibility was behind the second thoughts. He explained: "This will mean that both our own software and other people's can be run on both machines."

In fact, the US will be getting the Dragon 64 first. It will be sold there from August in a joint venture with Time Corporation New Orleans.

The first few thousand American machines will be made here. The rest is the US. Tony said.

He added that the price of the Dragon 32 was unlikely to fall again following the recent price cuts. He got the cost of producing the machine down so we passed it on to customers. He explained.

Micro robots link with Dragons

SCORP ROBOTTS are arriving for the Dragon 32, beginning with arms, both Powerline Electronics and Colne Robotics followed by floor crawlers from Colne and Joseph Electronics.

Powerline's Microgrip has two arms and costs £189 (all prices exclude VAT). It is available now and comes with all the necessary interfaces.

The Microgrip has an arm controlled arm jointed at shoulder, elbow and wrist positions. The arm rotates about the base and has a motor-driven gripper and position sensors.

Also available now is Colne's Armored robot, an arm which has two arms and costs about £480.

Both Colne and Dragon Data have backing from French high technology investment division of Pradon and Insurance.

Colne's Zeeler Micro Turtle will be available for the Dragon from the beginning of July. This then dated big robot



Robot for the Dragon 32 — Colne Robotics Zeeler Micro Turtle and Powerline Electronics Microgrip

— at £300 in its form. It's built — has sensors, horns and the ability to rotate legs.

A third company will enter the market later this year when Joseph will be offering a Dragon compatible version of its Edinburgh Turtle. The present price of this floor crawler is £235.

John Joseph explained that



the higher cost of the Edinburgh Turtle stemmed from its greater accuracy and ability to handle more complex design.

Economics, which many acquire, perhaps, the most well known robot, about the BBC's *Rugby* also has plans to use Dragon compatibility — but not until next year.

First it intends to look at the other machines in the market in schools, schemes from British and Research Machines before moving on to the Dragon.

Powerline Electronics can be reached on (0294) 64465. Colne Robotics on 01 582 8187 and Joseph Electronics on 01 735 3254.

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News Desk

01-833 3448



SALAMANDER SOFTWARE is moving into adventure and role-playing games, beginning with Franklin's Tenth and following up with *Golden Dragon* in the autumn. Adventure arcade players will not be forgotten. *Enter Zone* is set to follow *God Hunter* and *Enter Zone* is the market in *God Hunter* had a long run in the software charts, and *Enter Zone* has an equally high reputation. The adventure games have no graphics on the screen but come with a 30-page manual including more than 30 illustrations. *Salamander's Pine Real* explained that putting the product on paper leaves much more room in the memory for a complex adventure. The manual also contains clues, delivered by a speaking of real language. *Golden Dragon* is a role playing game which will take you on a machine offering users to move from one module to another, developing for each character.

Self - centring joysticks

SELF-CENTRING joysticks will be available for the Dragon later this summer, or you can use them now if you buy an interface from Alan Chandler from Mr Micro.

Flight Link Control expects to have its semi-professional self-centring joysticks available in September. The mechanisms are ready now but changes need to be designed before volume production is begun.

The interface from Mr Micro-called *Dragon Tamer* allows standard Atari or Altair-type joysticks to be used with the Dragon.

Both firms agree that the demand for professional and semi-professional joysticks is increasing.

But **Flight Link Controls** John Francis added it hurts to lose American units inferior to our own selling at high prices here.

Flight Link Control does not usually sell direct to end users. It is the source for the joystick from Microcentral Mod-

ern and Clarks reviewed in last month's *Dragon User*. John said that half a dozen dealers were interested in selling separate joysticks. In these parts too though, then **Flight Link Control** will consider selling direct to users itself.

The joystick will cost about £20 each firm added that they will also be high in reliability and precision, and keep the sensitivity of the potentiometer mechanisms they use.

But J M Gregory of Mr Micro argued that most potential joystick users have their own already programmed out of their. He thinks that the 3-d gull switch system used in Atari-type joysticks is ideal for arcade-type games.

The **Dragon Tamer** costs £8.95 and comes with a games tape. Mr Micro also sells joysticks for use with the interface. These cost from £7.50 each.

Mr Micro is on (081) 728 2282. **Flight Link Control** on (0420) 872448.

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Dragon clan gathering

The Scottish Dragon Club now has more than 500 members — we talk to the man in charge, David Anderson

BEHIND AS A crafter in an Edinburgh nightclub may seem a strange occupation for the president of the Scottish Dragon Club. But it gives David Anderson plenty of time during the day for tending the club and organising the Dragon — and plenty of opportunities to participate into the amateur and playboys programs he is running.

David bought his Dragon last summer and started the club with a couple of friends in September. It began with just a dozen people meeting in his flat — "I had the most space," he explains. But the idea mushroomed: each person put in about £20 and a postal club was started. Now there are more than 500 members, increasingly well-known, ranging from the over-60s to Draxians and increasing at an accelerating pace. However, David adds that there is a kind of conservatism — "Most of the members are in England."

Most of the money was spent on items such as stationery and a little on advertising. But the organisers decided it was only running the club like a business by advertising. Now they rely successfully on word of mouth with members getting their friends to join.

David reckons that most people who join are more interested in playing games than programming, preferring to develop their own "accidents in the laboratory." And the club can help them do this. It costs £5



Club president David Anderson

to join and the only fee he pays. In return you receive a newsletter with tips, advice and most importantly news about the club's discount offers.

Various software companies sell their games to members at discounts which range from 10 per cent to 20 per cent. Some business packages are also on offer. Items participating in the scheme include Sierra, Robot Software and BBC. David adds that Microsoft is not included, but has always been very helpful to the club. American magazines are also available at a discount — though *Elkay Electronics*.

There are also plans to sell paydubs to members at less than £10 a pair, although David said that there have to be tested first. Other possibilities include cheap blank cassette tapes from Hong Kong and a reduction on the Amiga (2400 parts). A Dragon repair service at a discount is already on offer and is likely to become more popular as Dragons come to the end of their guarantee periods.

The club now is to get the newsletter out monthly. New members get a starter pack with the latest newsletters and a list of items offering discounts. But David explained that there is more to the club than lower prices. The aim is to "provide for good software and hardware for the Dragon" — because there is so much bad stuff. Everything offered is tested first by David or one of his co-workers. Eight people are now involved with running the club, helping with typing, photocopying and answering members' queries. But the club still takes up an inordinate amount of David's time.

He himself is a dedicated games man, and is most interested by the quality of software coming out now, particularly from Microsoft. He hopes to move into becoming a full time games dealer (perhaps the classic (playable) computer editor) or maybe even starting his own software company. But he stressed that the club would remain independent whatever his occupation.

David's interest in computers goes back to school, although he dropped the subject at university. The BBC moved his interest when he got his job because a successful of program meant you were out of memory. And so he moved on to the Dragon 32, and left it to him — a particular with the Cram commands. However, he added that the BBC 32 was now keeping him to move up again.

Whether he has more children, the club will continue — a nucleus of eight Dragon enthusiasts will join to that. The club can be reached at 1 Station Street in Edinburgh.



The Scottish Dragon Club map in Edinburgh — but there is no need to go to the club

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*John Sorkin gives his fingers a
rest from arcade games and
lets his brain take the strain*

Software showdown

A & P Software's Desdemond

transports you to the Wild West where you can win a treasure of dollars and make it gold

AFTER LAST MONTH'S open of zipping and high speed alien destroying the month I shall concentrate on the sort of games that tend to make your brain rather than your fingers ache.

In general, arcade type games need to be written in machine code to approach the speed of the original, but most of those that rely on logical processors do not always need this speed and can be quite successfully written in Basic.

Escaping graphics

An escape game is one where you use high quality graphics, and a fine example of this genre is *Escape from Murderer's Den* by Sullivan, Moss and Platten-Singer (reviewed in last month's *Dragon*). This involves escaping from a three-dimensional maze. At the start you find yourself trapped on the top floor of a building. There are no hidden monsters waiting to pounce on you, all the threats are frontal, and it is even simpler, I only say losing your way to the lift (or elevator as this LSI game prefers it).

The problem lies in the fact that the elevator provides the only means of escape, and unless the correct code is entered you will plummet to instant death.

The fun is in, not the stop at the end as a result but as the clever notes successfully put it. To obtain the magic combination you may enter various rooms and attempt to decode mysterious sayings. This is a pleasant combination of several ideas and is an interesting program to add to any

collection. It is not so easy to ignore the correct code and I now leave the matter of the lift shaft most earnestly!

Since the recent court case, it appears that there is no longer any monopoly on the name *Murphy's*. A program that uses it to format its less popular board game is *Desdemond* from A & P Software. Instead of the subterranean settings of *London and Mathusalem* you are transported to Wild West (notterland) and you can capture diamonds or saloons rather than *Mayhem* or the *Big Red River*. If you feel *Lady Luck* is on your side, you can gamble away your earnings or trade in gold.

The display shows an exceptionally fine introductory picture, but the game is conducted in a lower resolution, the positions of the players being shown by different colours. The explanations are very clear but the screen is busy by rather rapidly. One distinct advantage is that you can sit the total length of the game at the start. This is an original variation of an old favourite at 99.99.

Those of you who are *Star Trek* fans will probably be pleased to know that there are several versions of this game available to *Dragon* readers. Before I come to these you may be interested in a game inspired by the TV programme. You probably remember the launch games of 3-D chess played by Spock and company. *Star Trekker* Software has produced a slightly more serious but no less exciting, entitled *Robert Naugles and Coopers*. The positions for play are chosen by entering

X, Y and Z co-ordinates on a base by base by four board. It is a shame that the origin is at the top left rather than the real astronomical convention of bottom left.

Long before the age of the micro-chip there used to be a board game very popular with children that used the same principle on a four layer perspex board and it was easy to wipe your rights along completed rows. On the computer version it is often difficult to see three rows until it is too late, as the four layers are shown next to each other across the screen. This just serves to keep you on your toes. The important lines can be rather long as various numbers are selected by the computer but in general it is faster than playing against a human opponent. It is reasonably well written, but it appears to get into an endless loop if you enter a coordinate that is already occupied by a piece. The instructions are clear and the game is like an *Elaborator* effort, packaged superbly.

Star Trekking

Elaborator provides one of the two versions of *Star Trek*, both confusingly called *Dragon Trek*. Its version games come with a 12-page flight manual. The game originally appeared long before Spock. *Invaders* launched themselves upon our TV screens, indeed until *Star Trek* appeared up its internal security it used to be a very popular pastime for up and coming extraterrests.

The mainframe version used to include

at the usual alternatives — short range and long range attacks, photon torpedoes, phasers and shields — but did not spend any time on gunner movement. This was due probably to the high incidence of two pointers, rather than WDLs, as I remember Salamander's vision stores lots of it, so that to steer round the galaxy (you control the ship) and shoot at long-range some very Klingon you discover looking in your sector. The Windows version is closer to the original game.

I have to admit that I'd rather watch an episode of Star Trek on the TV to playing a watered-down computer version, and I like Windows one has little innovations to attract me. The Salamander version, although costing nearly £10.00, does far more of the screen and is more interesting to play. It also uses characters from the TV series to inform you of your progress. Unfortunately, I think it must have got the message to come to her cabin, as I hoped she would!

Educational

Although the promised Dragon Dale school trial programs have yet to make an appearance in my review bundles, one or two others have supplied cartridges that could possibly be considered to be in that category. Gaim Software sells a couple of tapes called Educator. I used it, and it is somewhat curious to learn that their 'educational' as they provide questions on a variety of subjects without attempting to teach any thing. As general knowledge questions they are far superior to the format I remember to the TV game, *Who's Telling All*. There are usually five alternative answers offered, and you can gamble your points on different answers. Subjects offered are Geography, Inventions and Kings and Queens on Edouard I with Windows, Planets and Marsians on Educator II. My only criticism is that they are highly priced for microprograms at £9.95.

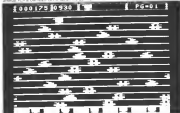
Good educational software is rare and far between for the Dragon — simple drill-type programs, namely, test acquired knowledge and there may be a large market for software that develops thinking skills. I used Dragon Dale's efforts with interest. With more quality programs on the market, Dragons could find their way into many classrooms.

There are one or two commendable titles in the market at the moment that provide you with a selection of games. I've mentioned before that many of these often contain just one or two mediocre games that give the appearance of being chosen together in a few evenings. When a collection appears that is better value for money, I try to get it as soon as I can, and it is to Gaim's Gamescape I feel much. This month's is also pleasantly surprised by Gaim's Software's Fun and Games. This contains eight games designed apparently for use at a party.

Crosses is a standard genre of Naughts and Crosses and is competent but not out of the ordinary. The graphics, however, are large and clear. The rest of the games impress as the tape progresses. The new one is a version of Mastermind (the colour



Salamander: R. J. Gaimon's 16-bit hit on the Dragon Dale II



Dragon Dale's Star Trek — a 16-bit Dragon Dale's game

code-breaking game, rather than the Magnus Magnusson version). Good reviews showing a very good value is a multi-tape called my pals of gold but offers no testing challenge. Soap stories, a sequence of playing cards and stories you to press the space bar when two consecutive cards are the same. The program gives you less time than the average button and you have to go on the ball to level it.

Anagram, which takes presents you with jumbled words which make up the names of UK towns and cities. If you're not feeling too bright, you can get the computer to shuffle the letters at random until they give you more of a clue. There are 300 towns held in data statements, so the game could be used as a versatile educational training exercise. Denkey is a good party game — very close to the original. A realistic and colourful aerial map appears on the screen, and you place a ball round the screen with it, catch it (as possible) while blindfolded. The closer you get, the higher becomes the risk from the loudspeaker and pressing the button loses the ball. Points are awarded unless you are spotted when you have declared the caught winner. Den is a puzzle-type game with dice and Games relies on memory and calculation skills.

Atlas is a very strange program and should appeal to business. Mine and Kendo are everywhere. Up to four people can select a choice of colour, shape and black preferences, and the Dragon pro-

ceeds to draw an abstract random picture. When you are happy with the result, it is stored on a graphics page and the other players have their turn. As the end of a turn on the computer (C) can judge which is the best effort. There is no clue what the criteria for a good picture are, but it seems a little unfair for the computer to judge what is actually its own effort. It is, however, an amusing concept.

Musical is the last program on the cassette and is essentially just for busy musical chains players. It uses the computer to switch on and off a music cassette and keeps track of who tells on the floor. Although by no means the most exciting tape in the review, Shields Fun and Games does provide for £5.00 a selection of eight entertaining games to turn up a children's party.

Party closers

Now for two games that you would only produce at a party when you exhausted your guests to finish, unless they happened to be war game fanatics. That is, Gamescape I reviewed the rather blood-thirsty program *Barbaric Wars* in which you follow the rules of the Knights of Bushido fairly accurately, so you can achieve quite a good score by really down-playing yourself — just to be able to begin again with a party winner.

St. C. Lashmore has turned to Ancient Greece for its Tyndal at Athens. Without examining the structure of the games, ■

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- Problems timed
- Correct answers are displayed if error made
- Full report at end of test

ESTIMATE

This programme is designed to help children practice their mental arithmetic. A selection of addition, subtraction, multiplication and division is given.

- Programmed for up to 5 students
- Five skill levels
- Timing takes to answer is recorded
- Correct answers are displayed if error made
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HI-RES

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[illegible]

Full playline ratings on your **BASIC** page and you have it all taken by the display with four separate channels. The amazing software uses the high resolution video to show the channels on the screen and allows you to use **BASIC** almost as normal. In fact there are a number of subprograms to **BASIC** to allow you to use the many additional features.

- Has graphics and text on the screen
- **GO** sets all menu standards. **SC** checks menu sets for **FILE/CH**, **SP/AN/4**, **CH/CHAN**, **TR/ID**, **RE/ST**, **US/**, **SP/CH**, **CH/AN/4** or **CH/AN/4**
- **RECEIVE** only on the **244** line going
- **SEND** **GRAPH/ID**, **MODE** enables any character to be on a key 8 and figure
- A most sophisticated keyboard with **AUTO REPEAT**
- **EXIT** and goes the missing characters on the **BLACK/ID** keyboard
- **ENTER** about 1500 bytes for **RE/ST**
- **SP** for **SP/AN/4** and **RE/ST** and normal modes at any rate
- **BLACK** on **FILE/CH**, **BLACK** on **WHITE**, **GREEN** on **BLACK** or
- **SP** to 10 characters mode for existing programs
- **RE** is a console for **SP/AN/4** programs

049W

University of York, Department of Psychology, YO1 5DD, UK

- Typically designed for constant use on the `main()` thread
- Does not use a separate stack
- Used for global or machine code routines to be called from `main()`
- Includes a `libc` dynamic shared object

Type your assembler program just as you would a BASIC program, and use BASIC to call **DAEMON**. When **DAEMON** has assembled your program it returns to BASIC where you can check for errors and assemble the program immediately, if required. The program you've saved and loaded using the **DAEMON** **LOAD** file. The assembled program may be saved to tape using **SAVE** and can only be loaded into **DAEMON** when the **DAEMON** file is loaded.

Q4.588 It is a fast (and synthetic) processor which allows letters of any length (the input) to be processed and the final character (or space) to be the 5000 characters and addressing modes are supported (the compressed character) characters for defining contents. Memory (the only) output is shown in a single line. It is a device by CAULI are reported with data to understand local memory.

DEMON

Manuscript received 11 October 2004; accepted 12 May 2005.

[illegible]

DEMOS gives you the ability to save the results of your commands. It features a text file display of memory operations in both hexadecimal and ASCII, and supports saving a full and partial state of the memory and register contents and machine instructions. There are several memory areas designed to support the debugger and saving machine code. BASIC programs with PEEK and POKE.

[illegible]

DASH/DEMON

[illegible]

Combined B10AC3 and D454 in one package. The other combination is developing B10AC3-like programs to the D454C3.

DECODE

100

Abstract

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GAMES ON CASSETTE

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Just before Harry and Stan tie a rope-making game at Grand Ocean, therefore, guests are warned about the danger they have just, the a-captains' capture. And here is the capture.

11-11-11 11-11-11

1216

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FTIR

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Abstract

1000

A. Pannofino's tactical adventure game: Solve the riddles and direct the party to the treasure.

CONCLUSIONS

Keywords: child sexual abuse; disclosure; disclosure strategies

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Picking a printer

Looking for a printer for your Dragon—Stephen Adams gives you a helping hand by examining six of the best



Amber 2400: print-up clear and paper handling, plus 100-dot legends

THE DRAGON HAS a socket on its left-hand side for a Centronics printer. This review looks at six printers which can be used: the Qibexco JP101, Seikosha GP100A, NEC 8022, Amber 2400 and two models from Epson — the P850 and P850.

The first thing to understand about the Centronics interface is that all the pins represented in byte form align bits at a time over eight wires. There are also some control signals and pseudo-data wires which have to be connected up between the printer and the Dragon. On the printer there is a standard 36 pin Anglia-style socket, but on the Dragon there is only a 26-way socket; so a specially made Up cable must be bought to connect the two.

It also means that some of the features of the printer are not available as they are implemented. These do not affect the operation of the printer, but are warnings — such as paper empty alarm and an input to reload the printer after an error. The printer can be done up just turning off the means switch on the cable, so it is not required by the average user.

All of the printers use the ASCII code and therefore have special keys for all the codes under decimal number 32. These can be used to implement such things as graphics, special features of the printer and containing letters.

A great deal of the features of any printer are implemented by control codes using the escape code. This is Cntrl(27) on any printer and can be followed by any number of codes depending on the application. It is not a printable character and so must be put out as an escape character to the printer. Any other control codes, as they are called, must also use the method as they may confuse the Dragon if printed to the screen.

Printing to the printer rather than to the screen is by the command Pntrl(27)Cntrl(2) followed by the Cntrl(2) or escape you want to print. Page 132 of the Dragon user manual has a brief description. Any number from 0 to 255 can be put out to the printer by using Cntrl(27) and so all of the printer controls are available. The most important of these is the CR code (carriage-return) which is set by most printer manufacturers to go to print on a new line, but to put return the print head to the start position.

The Dragon receiver requires that the

CR code produces a LF code (LINE FEED) action as well when a LF code is fed to the printer. Dragon users must try to feed out in the manual where the selection switches set so that this can be done. These selection switches control the way the printer is set up when printing on and also select the character set (English, American etc.) CR action etc. On the Seikosha model they can also start up on self test which prints out the entire character set continuously.

The differences between the various character sets is minimal and only require the changing of a few characters. All the characters are from 32 to 127 in the ASCII character set and printer manufacturers have sometimes used the other 128 characters for other purposes. On the NEC or Seikosha there is a set of graphics. Greek letters are on the JP101, though these codes are unused which seems a pity.

Graphics are available on all the machines mentioned and apart from the Seikosha all eight bits (eighty eight dots) on the printer (not vertically or horizontally). The Seikosha only prints on a 5 × 7 pin format, and so can only print seven dots as a column as against the normal eight. The eight bit is always a 1 to indicate graphics data. The way of implementing the graphics feature varies from machine to machine, it is easiest on the Seikosha and most difficult on the Qibexco.

The printing space is obviously very important to the final result and the greater the number of pins used to make up the character the better the result should be.

Amber 2400

A special cable is needed to connect up the Amber 2400, which has a 35-way D socket instead of an Anglia-style. The Amber is one of the cheapest plain text printers around; this also quite small (16 × 6 × 3 inches) and its own block box has only one control on it. This is for paper loading when not printing — pressing it while printing jams up the printer as you have been warned! The paper load also means a cut feed if the printer is installed on with paper feed present. A power on LED is also fitted.

The main problem with the Amber is its greatest asset: mainly it's fast. The maximum number of characters per line is only 24 (32 in graphics mode) and this means that a column print must then drop

quarters of the maximum Dragon normal of 32 characters. This should make no difference on all things because the characters contain on to the next line, new lines appearing where they should.

The print is very clear, being fed in from a cartridge ribbon which is very easy to insert — so only fingers! The paper is only 24 inches wide and is very cheap as it is also used by cash till. A large roll fits in a recess under the printer's cover.

The printer speed is not great at 18 characters a second, but it is simple if you don't want anything fancy. No fancy scripts and the lower case letters do not have proper descenders, as the bottom half of the p and y does not drop below the line of characters as in the text.

Double width, double height, and no indent of one space are the only special features. Double width characters of course mean half the number of characters per line can be printed, a maximum of 12. As I said at the beginning this is a cheap printer, but you also get a great deal of features.

Seikosha GP100A

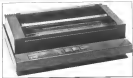
Seikosha GP100A is a one-of-a-kind printer as it only uses a 5 × 7 pin character. But using money, it also gives up the printer to only 30 characters a second. The paper used is normally leader lead, drawn along by sprockets on either side of the paper engaging at holes perforated in either side. There is an option to use sheet lead paper only, but having read this option I would not recommend it as it tends to put the paper from side to side.

The set-up switches for the character set, CR etc are made the machine, so a spreadsheet must be used to successively switch to set it up. It is a pity that manufacturers cannot mount their switches on the outside of the machine.

Putting in the paper is fully explained with pictures — it is also unfortunately the place the typewriter feed cable enters. The paper can be wiggled around to get it lined up properly over the sprockets. Then the covers (which are just the wings when opened) can be pushed down over the paper feeding. I noticed the paper can be advanced slightly by turning a knob on the top. The ribbon is a 10 inch long tang with two capsules on either end, one holding an ink pad which is



Dekota DP1004 uses a pre-printed label to deliver its 3.7 x 6.75-inch



Olivetti JP101 uses a glass tube filled with a graphite rod

• into the station as it goes round in a continuous circle. This way you always have to clip on to two holes of either end of the machine and then you have the tedious job of slipping the ribbon over the print head between it and the paper. The paper width can be between 10 inches (Dekota DP1000) and 3 inches, making it ideal for most jobs from continuous labels to word processing. The paper comes in boxes of 2,000 sheets, some of them are however going away 500 sheets free with every printer. Each sheet is 11 inches by 8 1/2 inches, including the hole at either side.

The point was very to sit on the printer I received due to the ink having dried out in transit — higher ink supplies can make the print a lot better. The characters have no true descenders but the graphics are easy to use as only one character is back space code (0) is required before graphics data is sent. Filled dots and graphics can be used on the same line. No special punctuation or controls are available on this printer, but the foreign characters are available above decimal 126 in the character set. This is a fairly cheap full-sized plain paper printer which is easy to use — a good first printer.

Olivetti JP101

The Olivetti JP101 again is a plain printer is another cheap printer as it uses no ink ribbon at all, but a glass tube filled with a graphite rod. This gives a graphite dot on to the paper via a high voltage spark. This mechanism is no chance of smudging the paper nor messy ribbon to fit and a faster print rate (50 lines a minute) it also means unfortunately a poor print quality — the resulting print looking as if it was done with a HB pencil. A fast print is supplied with every machine, using the left hand made of holding down the LF and the down feed switches at power on. The paper is easy to clip on to the tractor which can only release from 8 to 10 inches. An alternative friction feed is built in and works reasonably well again with smaller widths of paper.

One annoying thing is a cover station which goes off in an air printing just every time you want to see what is going on underneath the ribbon cover that covers the print head and rollers in the end a piece of paper (printed in the end a piece of paper) printed in the end a piece of paper (printed in the end a piece of paper).

Characters have true descenders and special features can get you up to 147 characters at 18.33 in inch. The other features include horizontal and vertical tabs, three sub-underlining, double height and width. The graph is set up at quite complicated, but it can be disabled in size by a zoom feature which prints every dot vertically and horizontally large. A cross diagram and layout is also included (which is unusual) as well as plenty of pictures showing how to set up the printer.

There is a built in 1K of memory which allows faster printing as the Olivetti does not have to stop for the slow speed of the printer. Also it prints forward and reverse directions with a 286K CPU for skipping (free spaces to cut down) the time it takes to print characters.

There are two indicators power local (printer disconnected from the control of the Olivetti) error and ink (which gives a warning that the ink supply is nearly used up). The Press switches apart with the right one on the side for local LF and FF. The left two only work when the printer is in the local mode LF advances the paper by one line and FF by a whole page of 11 or 12 inches.

Again the set up switches are located inside the printer.

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10 PRINT "1. SCREEN: 1. PC
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950 IF (1) THEN GOTO 150
960 IF (1) THEN GOTO 150
970 IF (1) THEN GOTO 150
980 IF (1) THEN GOTO 150
990 IF (1) THEN GOTO 150
1000 IF (1) THEN GOTO 150

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The Olivetti prints 24 characters a line

The JP101 has the features but not the print quality to give the Olivetti a decent printer even with the various control on full. When the technique has improved to give a thicker print it may be worth considering.

NEC PC8023

The last thing you notice about the NEC PC8023 is that it is heavy (35 kg) and built to take a lot of punishment. The machine is designed on a strong metal chassis and has an excellent print head compared to the other models tested. The PC has better feed and tractor feed to take paper up to 10 inches in width (the maximum being 3 inches). The paper is fed in through the top cover at the back of the printer and straight on to the paper supports (if used) it is then fed under the paper and a held in place by a very lightly spring bar.

The ink cartridge is also large and unique to this printer — it is a 10-inch square of ink on the back of the paper band. The ribbon is also held in place as normal as it uses the top and bottom of the two separate ribbons. It is a very noisy even with the clear plastic cover the printer (the switches to control the direction of the paper and the ribbon are located under the paper where the paper band is covered by a clear plastic strip. There are seven switches in all, each one has a red and a blue showing the on and off state.

The speedy machine has a buffer RAM memory. No size was given but it seemed on printing for a good 14 seconds after the Olivetti had finished printing. It also prints both ways and uses logic printing to feed the next character to print. The print speed is 180 characters a second.

On the top of the machine are three 100% REL on line/total paper empty and power. The three switches on the top are REL, LF and FF. An on/off switch is located at the side. The only problem I had was getting off the rear cover to look at the ink or ribbon ribbon as it was very difficult. The paper cover on the other hand comes off very easily. The character set includes Greek and most European languages in one word aspect, but it also includes a graphics set. This consists of blocks, lines and curves based on what looks like the Pal characters set.

The printer has wide variety of print modes with proportional spacing. ■



NEC PC8000—the mechanism is designed as a string-motor-driven



Epson RX80—its different modes and motor can be mixed together

• It prints up to 196 characters and down to 48 characters. Each 1960 (wide 273) code has a four to 10 line description of what the command does and in the back is a usage Basic program to demonstrate all the possible modes. These include setting line spacing down to 1/44th of an inch horizontal and vertical tabs, start position and graphics.

The character set has proper descenders and a very clear when printed on the 7 x 9 matrix (3 x 9 for graphics). The only problem might arise when programming some commands as the numbers for each thing are a bit settings and length of graphics bytes are given as decimal. So a setting between 0 and 999 would require three bytes, in the version one 141 eight number from 0 to 9.

The manual is clear but full on most subjects, the only problem being at the beginning it was obviously designed to work with NEC PC8000 series of computers and although noisy (about half a long line and good good service) the only printer could be spines at everything on the printer is fully unique and it could be substituted before it needed to be sold and working life.

Epson RX80

The RX80 is the latest in a series of dot matrix printers from Epson. It and its brother the FX80 have now taken over the lead set by the MB80 and MX180. These clean boxes contain a very sophisticated printer for the price, with one of the best print qualities I have ever seen on any printer. The RX80 comes with only a motor feed from 3 to 10 inches with no option for tractor feed (and sheet paper or rolls).

Again the printer setting up switches are found inside the machine and page 4 of the manual explains "The user should only be operated by a service person". Then after showing how to remove (slipping screws) insert the ribbon cartridge (which

is as long as the machine is wide) and load the paper it goes on to explain how to remove the top part of the paper. This is not as easy as it looks and may have some people wondering if they are going to tip the case apart before getting the top off.

The settings allow you to change the descenders and prevent the end of paper detection stopping the printer as squares every inch (at the paper). CR and a few wide 1820 graphics characters in the codes 126 to 159. Also a sets the print mode to condensed (132 characters a line) or pica (80 characters) a line. The print mode can also be selected by software through the ESCAPE code sequences listed in the manual.

There are no different print modes and most of them can be mixed together to give multiple effects. For instance you can have enlarged pica sized italic or double struck characters. All characters have true descenders and when double struck a word the space between the data printed by the print head is filled in by going over them again. This makes the final look like a very decent typewriter. The escape control codes do have a page or more explanation on them with good examples and a program in Microsoft Basic to try them out. The characters can be printed in super or subscript (as in chemical formulae) and where they have are mixed with normal codes (and the line spacing can be set to 1/44ths of an inch).

Vertical and horizontal tabs as well as form length can be specified plus the margins on each side. There are 48 different escape commands including no different for graphics modes. These allow you to draw pictures by specifying the individual dots on the paper. A good example of a computer photograph is also shown in the manual to illustrate the point. The graphics require a lot of escape codes to set them but you can mix text and graphics on the same line. The

graphics must be done without the CR doing a LF, so it is a little tricky for someone to change the switch setting.

The print quality is excellent, even in the graphics mode which usually shows up errors at the first feed movement. The print head can be replaced quite easily by unplugging it from the PCB socket under the paper and pulling the head from the floating holder. This and general cleaning are all the maintenance required.

If you don't want tractor feed paper and have the money this is the printer to buy.

Epson FX80

The FX80 is more expensive than the RX80, but has all the same features plus a lot of extras. There is a last detachable character set at 255 characters and an of RAM buffer (which allows the computer to be released from printing quickly) if you do not use the last detachable characters. Proportional spacing is possible so you get what looks like normal writing. A lighter density graphics and mode, reverse line feeding, tractor feed and tractor lead are standard but the tractors are restricted to 8 1/2 to 10 inch wide paper unless you buy an optional extra. Unfortunately the paper loaders for tractor lead are also optional extra.

At least the switches are under a cover which is easy to remove and change.

The RX and the FX80 both have a self test facility and also can dump all bytes received as hex on to the paper for fault finding. The printer has to be switched off before you can get back to test. However.

A word of warning: the FX80 costs more, but some day when you would have trouble reaching its quality.

Most find the prices quoted in the table are recommended retail excluding VAT. Since prices will be lower. Thanks to the manufacturers for supplying the printers and to GPO Business Machines for the GPO's model. ■

Printers reviewed: from \$88 to \$438

	Characters a second	Tractor	Proportional spacing	Dot matrix	Descenders	Maximum characters a line	Proportional spacing	Minimum line space	Price	Telephone contact
Amstar 2400	44	No	Yes	8 x 7	No	24	No	Yes	188	(0284) 478881
Barbican G1700A	30	No	Yes	8 x 7	No	24	No	Yes	5718	(2044) 475288
Cosmos JF-10	77	Yes	Yes	7 x 7	No	147	No	Yes	1280	01 496 5888
NEC 8020	100	Yes	Yes	7 x 9	Yes	138	Yes	Yes	1585	01 266 6100
Epson RX80	190	No	No	8 x 8	Yes	157	No	Yes	1268	01 552 4857
Epson FX80	180	Yes	Yes	11 x 8	Yes	137	Yes	Yes	1438	01 552 4857

Dragon's giant strides

Tony Clarke talks to Graham Cunningham about Dragon Data's future as the company prepares to attack new markets at home and abroad

Which YOU see into a taxi outside Port Talbot today almost the devil says. You must want Dragon Data. A lot of people want the Welsh company at the moment, both at home and in the US, as it expands the range of machines it offers.

By the time next year Dragon Data plans to be marketing four microcomputers, moving up gradually to attack the business market. The first step is the smallest one, a CPU wrap for the Dragon 30 giving users 64k of RAM. But after that the steps get bigger and bigger: the Dragon 64 will be followed by a 2400 machine and a 20,000 business model next year.

The guiding force behind these moves is managing director Tony Clarke — planning about it for 4 months till he expects to be able to take them all in his stride.

A computer enthusiast as well as a businessman

One of the other driving forces about Dragon Data's managing director is that he is an enthusiast as well as a successful businessman. While promoting the merits of the company's disk drive system he sits in on all the Western Digital committee also at work. Seminary conversations about the 2400 machine moves into discussion of the NEC 7800-600.

And this enthusiasm spreads further than someone famous. Talking of the business market, Tony describes needs, configurations and possibilities to provide the

automated office of the future. This includes Manpac, a 1000-processor job-entry system which began life as a timer suggests with modest applications but has moved into the business market on such machines as D'gool 6000 mainframe.

Also covered are the virtues of easy-to-use systems such as Apple's Lisa and Xerox's Star incorporating mouse devices. There are desktop controllers which can be used to move items displayed on a screen. Microsoft's screen-oriented Control Panel is used on the Dragon 30. Its recent introduction a change for use as its Multi Tool word processing system.

And on the office outside his own sits a range of machines which he will take apart and examine. Elsewhere in the company various models — including micro, mini and computer-aided design systems — are being put through their paces in practical applications.

As far as the business goes, Tony has a personal stake in the success of Dragon Data. The company began life as a subsidiary of Mullup in the spring of 1982. In November a consortium including Tony was formed to purchase the firm which moved to a new factory in south Wales. Since then Dragon Data has become the largest privately owned company in Wales and is set to grow even faster as the new products are launched and new markets are attacked.

The summer launches — the CPU wrap and the disk drive system — will certainly move the Dragon 30 into new markets as they introduce the



Tony Clarke — introducing OS6 on the new Dragon Data 64-bit office system — will lead 6000 time-line operating systems from American software house Microsoft.

This is a multi-user multi-tasking system for small business users which has a very high reputation in the US — as high that some observers have suggested tongue-in-cheek that it is 'too good for home computers such as the Dragon'. This has prevented other micro manufacturers such as Tandy and various Japanese firms, choosing a further British company. Pac 1100 users in an 80,000-1000 system.

As a recent operating system it has time applications software available for a than

more established systems such as CP/M, but a lot of languages are already around including Basic, Pascal and Cobol. IC computers are also available which provide a high degree of software portability across different languages.

Moreover says that OS6 combines the same friendly system interface found in Bell Laboratories Unix operating system with an efficient mod also design that is currently product for use with an advanced 8-bit processor. And a 1000. In the future there will be updated compatible versions for the Motorola 68000 processor.



and loading mail.

Maximum software is already being used by a wide range of customers including Goldman-Kodak, General Electric, the National Aeronautics and Space Administration (NASA) and the United States Navy. This is the kind of company Dragon Data is joining.

But not too many Dragon 32 users are expected to be introduced in the disk drive system which sells under \$390 at entry level and about \$500 with two drives. Tony commented: "We think about 10 per cent of Dragon 32 users will take the double drive system — more on the Commodore



Port Taber's national employee.

Deming) aimed for the Dragon is strong and Tony says it is fast becoming the biggest selling home computer on the Commodore. But he added: "It is a different market with more home owners using the machine at work. He puts the sale down to lower costs being higher, as machines are used at work to provide information at little extra cost.

Consolidating the new operating system's launch

The introduction of DOS will be consolidated with the launch of the Dragon 64 in September. Tony is sure that there is a demand for a small business computer that is relatively cheap, and that the 64 will meet this demand. He expects packages including the micro, a monitor and drive to sell for about £1,100. The 64 will give 64 columns by 28 lines on the screen and will have an HD6303 interface. The machine will involve a rotating change for Dragon Data — some 64s will be sold through high street chains like Boots but more are expected to be sold by buyers as off-the-shelf systems.

An RS232 interface is also a feature of the Americas Dragons which will be launched this summer costing about \$399 in partnership with Tano Corporation of New Orleans. Tony admits: "We're not expecting to sell millions in the US because there are a lot of machines at that price in the market."

But interest is already high. He looks for Dragon 32 to win American computer office sales

April and about 4,000 dealers made enquiries. Only 150,000 dealers will be involved initially but this will go up to 1,000 as popularity rises from a starting figure of 2,000 a week.

The marketing strategy in the US aims to profit from the pricing war being fought there by the main manufacturers. Tony commented: "We think dealers will be keen because they are losing their profit margins. He added that he expects to use Commodore, Atari and Texas Instruments dealers.

Tano Corporation, which has 180,000 square feet of manufacturing space, was chosen ahead of five other companies. Its background is in mass automation systems including a lot of experience using the 6809 chip on which the Dragon 32 is based. And Tano already sells another micro — an Apple-like design in Holland and manufactured in Korea.

Among all the society, Dragon 32 users are not being forgotten. While plans to launch it prefer have been shelved, a cassette recorder guaranteed to work with the Dragon is due out this summer.

Tony explained that a printer was not very likely at the moment, because good ones were available and the falling value of sterling was causing financial problems when buying from abroad.

Dragon Data's other machines will also be sold in the US. The 2000 model, as far as a name will be a top 6809 system dropping the company's attack on the educational and business markets. In addition to DOS

the intention of this 4 will run Plus, a longer established operating system which has more applications software available for it.

At £400 the machine is also aimed at the home user, offering improved basic and high quality graphics. And it will break away from the Dragon 32 mould, looking different to previous machines.

While Tony agrees that there is an overlap between the machines discussed so far, he agrees that each has excellent facilities in terms of value for money.

Acting is active a high level of software portability

The appearance of next year's micro will again be achieved. Resolving it under £2,000 this will offer "a unique bus structure giving a high level of software portability. Tony added that it will run 68090 based and 68010 based software either independently or both together.

This complex problem solved by early 1984 users who found themselves short of early available software. A lot of the development work is already finished for this machine, which Tony expects to sell more of in the US than in the UK.

Dragon Data is expanding its present factory to cope with these plans and negotiating with the Welsh Development Authority for another site. While Port Taber's national employee, the deal will be shipping the microcomputer mass factories down the road is driving. ■

GEN SOFTWARE

PROGRAMS FOR THE DRAGON 32

PERSONALITY by G. M. Anderson

Dragon 32 can be used as a personal diary. Enter all the data which will form your own personality profile. Includes a personality test. Price £14.95

PICTA by P. Hogg

Use the Dragon 32 as a file for all your pictures and photographs. Includes a drawing program. Price £14.95

PERSONALITY by G. M. Anderson

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Also available on cassette for the Dragon 32

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TRIG 15: A machine code game for the Dragon 32. You are in an anti-air flying low over New York with a limited supply of fuel. The aim is to bomb away the skyscrapers and there is a 5 g enough space to land.

You have 50 bombs which you can drop using the enter key. You also have 15 lasers blasts to use. The laser clears a space — it is fired with the shift key.

You can move up using the up arrow

key, but each time you do the jet will use one of your 50 fuel units. When you have cleared a large enough space to land, you can descend using the down arrow key.

The published listing must be typed in. When it is run it automatically puts the actual machine code into memory and displays itself. You must then type in PRG# 27 (4440).

This allows the machine code to be saved

using the GSAVE command to the disk disk.

This is more reliable than using COVRM# and allows the machine code to be saved together with the short Basic controller program. It is advisable to save the original Basic program with the data because if any of the numbers are wrong the program will crash the computer when run.

```
1 DATA 86,33,07,35,52,07,35,56
2 DATA 86,0F,07,35,57,86,3F,07
3 DATA FF,23,10,8E,00,00,10,0F
4 DATA 35,53,10,8E,07,08,10,0F
5 DATA 35,59,0E,11,FF,86,AA,A7
6 DATA 02,0C,05,FF,26,F9,10,8E
7 DATA 01,12,1F,20,86,8C,1F,03
8 DATA 86,20,07,04,10,0C,11,0F
9 DATA 1F,12,04,04,10,0E,06,86
10 DATA 69,04,3F,5C,A7,30,31,88
11 DATA 80,5A,26,FB,86,5C,A7,20
12 DATA 30,01,7A,04,10,26,C1,8E
13 DATA 07,04,86,00,01,AA,10,26
14 DATA 02,28,86,88,30,81,AA,10
15 DATA 26,03,1F,86,88,40,81,04
16 DATA 8C,10,26,03,15,8C,11,0F
17 DATA 10,2E,03,E3,34,74,0F,07
18 DATA 86,FF,0C,01,51,A7,80,8C
19 DATA 01,5A,26,F9,80,88,C5,35
20 DATA 74,81,5C,10,27,00,71,81
21 DATA 0A,10,27,00,76,FB,04,18
22 DATA 1F,10,C4,20,C1,00,10,37
23 DATA 00,89,86,04,15,81,00,10
24 DATA 37,00,78,81,0C,10,27,01
25 DATA 86,10,88,35,53,10,8C,00
26 DATA 00,10,26,00,84,84,5A,A7
27 DATA 00,86,8A,A7,1F,86,AA,A7
28 DATA 1E,86,86,A7,88,20,84,57
29 DATA A7,88,1F,86,AA,A7,88,1E
30 DATA 86,55,A7,88,40,84,55,A7
31 DATA 88,3F,86,8A,A7,88,3E,30
```

```
32 DATA 01,10,8C,35,88,31,3F,10
33 DATA 8C,00,00,26,FB,10,88,07
34 DATA 08,10,8F,35,88,18,FF,82
35 DATA 8C,07,40,10,25,FF,AA,86
36 DATA 35,52,81,00,10,27,FF,A1
37 DATA 7A,35,52,86,AA,A7,1F,A7
38 DATA 1E,A7,88,1F,A7,88,1E,A7
39 DATA 88,3F,A7,88,3E,30,88,40
40 DATA 10,FF,86,86,AA,A7,1F,A7
41 DATA 1E,A7,88,1F,A7,88,1E,A7
42 DATA 88,3F,A7,88,3E,30,88,40
43 DATA 18,FF,88,10,8E,35,53,10
44 DATA 8C,00,00,10,26,FF,62,86
45 DATA 35,56,81,00,10,27,FF,59
46 DATA 7A,35,56,1F,12,10,8F,35
47 DATA 53,86,0F,07,35,53,10,8C
48 DATA 04,44,10,0F,35,58,1A,FF
49 DATA 40,10,88,35,53,86,AA,10
50 DATA 8C,11,0F,10,28,00,2A,8F
51 DATA 20,47,88,30,31,88,40,AA
52 DATA A8,20,81,AA,26,30,86,88
53 DATA A7,20,86,A2,A7,88,20,8F
54 DATA A8,40,10,8F,35,53,10,8E
55 DATA 04,44,10,0F,35,58,1A,FF
56 DATA 1A,86,AA,A7,20,A7,88,20
57 DATA A7,88,40,10,8C,00,00,10
58 DATA 8F,35,53,1A,FE,FF,C6,0A
59 DATA 34,04,86,40,8F,FF,24,C6
60 DATA 64,5A,C1,00,26,FB,4F,87
61 DATA FF,24,C6,44,5A,C1,00,26
```

Continued on page 27


```

62 DATA FB,35,04,5A,C1,00,24,50
63 DATA CE,01,F4,FF,35,50,7A,35
64 DATA 55,84,35,55,81,00,10,24
65 DATA FF,9C,84,8A,A7,20,A7,40
66 DATA 20,A7,88,40,10,80,00,00
67 DATA 10,8F,35,53,16,FE,84,84
68 DATA 35,57,81,00,10,27,FE,A1
69 DATA 7A,35,57,7A,00,A7,01,A7
70 DATA 02,A7,03,A7,04,A7,05,10
71 DATA 0E,00,FA,C4,14,FF,3F,0C
72 DATA 7C,37,8C,F4,37,8C,5A,C1
73 DATA 00,24,F8,84,40,87,FF,24
74 DATA F4,37,8C,5A,C1,00,24,F8
75 DATA 84,00,87,FF,24,31,3F,10
76 DATA 8C,00,00,24,80,8A,AA,A7
77 DATA 01,A7,02,A7,03,A7,04,A7
78 DATA 05,A7,88,31,A7,88,22,A7
79 DATA 88,23,A7,88,24,A7,88,25
80 DATA A7,88,41,A7,88,42,A7,88
81 DATA 43,A7,88,44,A7,88,45,16
82 DATA FE,37,2D,00,00,00,31,0E
83 DATA 07,00,10,8E,12,00,AA,A2
84 DATA 81,49,10,27,00,8E,81,55
85 DATA 10,27,00,8D,84,55,A7,20
86 DATA 10,8C,04,00,24,88,30,88
87 DATA 0F,84,FF,A7,88,A7,88,1F
88 DATA A7,88,20,A7,88,21,A7,88
89 DATA 28,A7,88,28,A7,88,3F,A7
90 DATA 88,40,A7,88,41,A7,88,42
91 DATA A7,88,43,A7,88,8F,A7,88
92 DATA 60,A7,88,61,A7,88,00,80
93 DATA C4,3C,10,8E,00,01,10,8F
94 DATA 37,8C,1F,78,84,07,81,00
95 DATA 24,03,7C,37,8C,10,8E,37
96 DATA 8C,31,3F,10,8C,00,00,24
97 DATA F8,84,40,87,FF,24,10,8E
98 DATA 37,8C,31,3F,10,8C,00,00
99 DATA 24,F8,4F,A7,FF,24,5A,C1
100 DATA C0,24,CF,84,8F,10,8E,00
101 DATA C0,A7,62,10,8C,04,00,24
102 DATA F8,10,8E,04,C9,84,1F,A7
103 DATA A0,84,0F,A7,A0,84,15,A7
104 DATA A0,84,80,A7,A0,84,03,A7
105 DATA A0,84,12,A7,A0,84,01,A7
106 DATA A0,84,13,A7,A0,84,08,A7
107 DATA A0,84,05,A7,A0,84,04,A7
108 DATA 20,14,01,28,84,14,16,FF
109 DATA 40,84,00,16,FF,40,34,12
110 DATA 8E,04,00,84,60,A7,80,8C
111 DATA 00,00,24,FF,35,12,10,8E
112 DATA 04,C9,84,3F,A7,A0,84,4F
113 DATA A7,A0,84,55,A7,A0,84,60

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114 DATA A7,A0,84,4C,A7,A0,84,41
115 DATA A7,A0,84,4E,A7,A0,84,44
116 DATA A7,A0,84,45,A7,A0,84,44
117 DATA A7,A0,84,61,A7,20,31,AA
118 DATA 34,84,45,A7,A0,84,22,A7
119 DATA A0,84,45,A7,A0,84,4C,A7
120 DATA A0,84,60,A7,A0,84,4C,A7
121 DATA A0,84,45,A7,A0,84,46,A7
122 DATA A0,84,24,A7,A0,84,7D,A7
123 DATA A0,31,AA,16,84,42,A7,A0
124 DATA 84,4F,A7,A0,84,40,A7,A0
125 DATA 84,42,A7,A0,84,53,A7,A0
126 DATA 84,60,A7,A0,A7,A0,A7,A0
127 DATA A7,A0,84,7D,A7,20,10,8E
128 DATA 05,14,85,00,A7,37,4D,F4
129 DATA 35,53,4F,7F,37,4E,78,37
130 DATA 4E,58,4F,81,04,25,05,60
131 DATA 0A,7C,37,4E,7F,37,4D,24
132 DATA 8D,88,70,A7,20,84,37,4E
133 DATA 88,70,A7,3F,84,08,A7,37
134 DATA 4D,F4,35,24,4F,7F,37,4E
135 DATA 78,37,4E,58,4F,81,04,25
136 DATA 05,80,CA,7C,37,4E,78,37
137 DATA 4D,24,8B,88,70,A7,88,20
138 DATA 84,37,4E,88,70,A7,A0,1F
139 DATA 10,8E,9B,58,EC,20,84,00
140 DATA C4,1F,1F,01,84,40,87,FF
141 DATA 24,E6,20,5A,C1,00,24,F8
142 DATA 84,00,87,FF,24,E6,20,5A
143 DATA C1,00,24,F8,30,1F,8C,00
144 DATA 00,24,E1,31,21,10,8E,98
145 DATA 8C,20,D1,20,03,12,12,10
146 DATA 8E,05,C8,84,41,A7,A0,84
147 DATA 4E,A7,A0,84,4F,A7,A0,84
148 DATA 54,A7,A0,84,48,A7,A0,84
149 DATA 40,A7,A0,84,52,A7,A0,84
150 DATA 60,A7,A0,84,47,A7,A0,84
151 DATA 41,A7,A0,84,4D,A7,A0,84
152 DATA 45,A7,A0,84,60,07,0A,84
153 DATA 7F,A7,A0,3F
500 A=MH32CB
510 READ A:POKE A,VOL("AH"+A$)
    A=A+1
520 IF A<MH379C THEN 510
530 DEL=530
1000 PHODE1,1:PELS
1010 SCREEN 1,0
1020 EXEC 13000
1030 SCREEN 0
1040 A$=INKEY$:IF A$=""THEN 1040
1050 IF A$="Y"THEN 1000
1060 END

```



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Play golf

Learn how to make the most of the Dragon's graphics commands by playing Philip Brooker's game of golf



THIS PROGRAMME is a simulation of a round of golf for up to four players. Over the first nine holes, the last hole of all 18 holes each player takes a turn at controlling an individually coloured figure to drive a ball from the tee to the green and then into the hole. Hazards include rough bunkers (areas and water). Each player's score is updated and displayed at the end of his turn.

The program begins by requesting details of the number of players taking part and whether they wish to play the first nine or second nine or all 18 holes. It then calls for the last player and displays details of the hole to be played, including its length. The display then changes to a high-resolution view of the fairly detailed, set by the rough (the red areas), lakes and streams are drawn in blue, bunkers are solid yellow areas, trees are yellow with red trunks (1), and the green is a solid yellow circle with somewhere in it a flag. The position of the flag changes each time the game is played. The ball is shown as a yellow spot and somewhere near the ball is a figure coloured differently for each player.

The figure may be moved around the display, jumping in front of the hazards, by means of the joystick control. Incidentally, despite what it says in the Dragon head-book, my machine interprets JOYSTICK as JOYSTICK1 as relating to the right joystick. When the figure is over the ball and a stationary it produces a club and addresses the ball. The club will flash alternately blue and yellow so that it can be seen against any background. The position of the figure can then be adjusted and the club will cover half of the ball, and the shaft of the club is at a right angle to the direction the ball is to go, remembering that the club is always swung and released to strike the ball.

The backswing is begun by pressing the joystick firing button. The figure then winds up one notch at a time until the button is released, or until it reaches the full swing of twenty notches. It then swings and strikes the ball. A full strength swing from the halfway interval travels about 200 yards, plus or minus anything up to 40 yards, though just occasionally a

shot falls considerably shorter. It is important to remember that the runway shape are not all drawn to the same scale, and the hole length displayed at the start of each turn gives an indication of how far across the screen a shot is likely to go. A shortened backswing produces a particularly shorter shot. If the ball is not correctly addressed there is a hook or slice that may result, the ball travelling off line and with reduced carry. If the club head does not contact the ball then an air shot results and the ball won't move.

In flight the ball passes over lakes and bunkers and through the tops of trees. Over yellow (background) areas it changes colour so that it may be seen. If it enters the rough it stops immediately and must be played directly back on to the runway. If it strikes the trunk of a tree in its flight then it may bounce off in almost any direction or continue its flight.

If at the end of its flight the ball is still exact a disappears in a circle of ripples. Over yellow (background) areas it changes colour so that it may be seen. If it enters the rough it stops immediately and must be played directly back on to the runway. If it strikes the trunk of a tree in its flight then it may bounce off in almost any direction or continue its flight.

On the green

Eventually the ball lands on the green. The display then changes to show a smaller view of the hole, the figure and the ball. The ball can now be pulled into the hole. It is possible to hole out directly from off the green, but I have never yet managed it. There are no random factors in putting, all greens are to the same scale and all putts are predictable (just put your foot out Jack Nicklaus). Short and hole shots are as far as possible, however, and if the ball is struck too firmly it will overshoot the hole. If

the ball is played off the putting surface then the display reverts to the runway map and the ball must be chipped back on to the green.

When the ball is finally holed the player's score for the hole is displayed and it must then calculate the player's running score. The next player is then called and the runway map reappears. After each player has completed the hole the entire programme is repeated for the next hole and so on until the end of the game, when a full list of total scores is displayed.

A complete listing of the program is printed with this article. It loads in about 12K of memory and when running uses about 1.5K free. My starting PCMC and speed of it should be possible to create enough room for additional features. Some ideas that come to mind are a handicapping system or a record of any and all balls for a hole in one!

The rather complex routine by which the figure is moved over a varying background without flicker makes full use of the Dragon's graphics commands. Both the high-resolution memory areas available in MODE 3 are employed, with the picture stored in one being displayed while the other is modified. For the purposes of the following, I shall refer to the memory area called by PMODE 3:1 as area 1, and that called by PMODE 3:2 as area 2.

After initialization and at touchdown routines control passes to the 'player count loop starting at 4000. A message is written to the text screen giving details of the last hole and player. While this is displayed subroutine 6000 is called. This draws the figure of the player's colour and stores it in arrays BD, WL and SL. Body-walking leg and standing legs. Lines 4710 to 4750 now draw the runway map in area 1. Line 4760 calls subroutine 100, which copies area 1 into area 2 so that both areas contain the runway map minus the figure. Control then passes to line 1000.

Line 1000 switches the display to high-resolution area 1, which contains the runway map. Below the figure is PUT into position. Line 1020 stores the details of its background in arrays B1, B2 and B3. The figure, made up of BD and two copies of SL, is positioned. Lines 1040, 1070, 1070

1950 and 1980 are relevant if the 1950 data have been distorted as a result of the 1950 census. The 1950 census was the first census to use the sampling frame, and the 1950 census sample is the only one that provides the values of the variables used in the 1950 census. The 1950 census is the only one that provides the values of the variables used in the 1950 census. The 1950 census is the only one that provides the values of the variables used in the 1950 census.

If the `display` of the previous subfigure (100) is called `White area`, it will display area 2 is modified as follows. The background arrays are PUT into their original positions. Starting out, the figure (line 120) then shows the background to the new position in these arrays and the figure is then PUT into its new position (lines 130-140). As an added refinement, one of its legs is raised up through writing: `WHL`, in line 140 is used to ensure that alternate legs are raised each time (i.e. subfigure 101).

With the figure finally in its new position but not yet displayed line 1379 can substitute 110 which copies the new picture stored externally into area 1 of the display. After a short pause the relay leg is lowered by PUTting 50 into both leg positions (line 1380). The running on continues at the figure position and then stopped and the program returns to the external memory loop.

Later (2040) can provide an alternate solution to the problem of the loop. If the figure is close to the ball, and the joystick is centered, then subtract from 2040 a value

Lines 1800-1850 are concerned with drawing the club in the right direction with constant length, with the corpus after falling at each pass. The club is drawn in line 1840 and after a short delay is blasted out by sub routine 180. This is preferable to a simple PPAULT as it restores the club background to its original colour or colour instead of leaving a line or whatever. In the current background colour is restored.

green) Control their return to the position

Line 1800 provides the only exit from the loop. If the system has buttons as pressed then control jumps to line 1805 and the backspacing commences. The number cranking at line 1800-1850 dates from the angle the club is being pivoted at with \dot{Q} being straight up. The backspacing routine is similar to the club drawing routine, except that at each pass the values of \dot{Q} and \dot{C} are recalculated from the angle A which represents by $P112$ each time. The previous club is blanked out by subtracting 713 and the new club is drawn normally in yellow unless the club head coincides with a yellow area, when it is drawn red.

Background: The purpose of this study was to determine the prevalence of

The other distance – counter S_2 and the swing counter S_1 are both incremented after which lines 1800 and 1810 check the end of the balancing. At the end of the balancing the distance between the shot and the ball is checked. If this is greater or less than the length of the shot, the ball angle AB and shot distance SD are modified to produce back or slice shots from the carry, straight or bananas are further modified by lines 1950-1980. The swing routine is a repeat of the balancing except that the magnitude of the steps is increased and their number decreased although note the addition of a constant to the count to provide follow through.

At the end of the casting the 3500-tons for an an shaft. If the an is found then the player's score is increased and points referring to the spare conversion points a lot than the ball is finished but the loop of 3500 is entered. This moves the ball in steps across the screen, checking the background colour and if necessary, adjusting the colour of the ball. Also, once the target area is checked, it also reads

line 3030 that the ball is not in the rough or that it is in a trap. On the green, the check at line 3040 is that the ball has not left the green.

When line 3070 detects that the ball is in a red area, the program jumps to 3030. Lines 3030-3040 check for striding a line. If not true, it checks that the ball is in the rough and control is passed to the figure movement system. If a line is struck and it is the first time this has happened then shot then the ball angle AB and shot distance SD are obtained randomly and the program loops back to 3030. The ball angle is modified in such a way that the ball can never wind up in the direction of the figure. Having the ball control is set in the figure's mind on or off, depending on

When the ball finally comes to rest several checks are made. These are all documented within the log, and should be self-explanatory. With the ball securely in the hole, the player's score and running score are displayed before the next player is called.

The program can begin as it did by now, thanks to POKÉ 65458's continuous running speed. This has the effect of turning up the input/output activity, and programs can be neither loaded or saved until it is reset either by the reset button or by POKÉ 65458. If you break out of the program before that and don't forget to reset before trying to load what the program is, it is probably advisable to replace the ROM with a ROM unit leaving all debugging is completed. It is very easy to save an unwanted program as long then discover later that you have overwritten the next and to discover a load of garbage over your only copy! I save, with both, everything.

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[illegible]

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 5. **SUBJECT:** *Example: Business Meeting on January 15, 2024*
 6. **RE:** *Example: Project X - Q4 2023 Report*
 7. **ATTN:** *Example: Mr. John Doe*
 8. **CC:** *Example: Mr. Jane Smith, Mr. Bob Johnson*
 9. **DATE:** *Example: January 1, 2024*
 10. **TIME:** *Example: 10:00 AM*
 11. **LOCATION:** *Example: Conference Room A, 123 Main Street, New York, NY 10001*
 12. **AGENDA:** *Example: Project X - Q4 2023 Report, Project Y - Q4 2023 Report, Project Z - Q4 2023 Report*
 13. **CONTACT:** *Example: Mr. Jane Smith, 456 Elm Street, New York, NY 10002, Phone: (212) 555-1234, Email: jane.smith@abc.com*
 14. **NOTES:** *Example: Please bring a copy of the Q4 2023 Report to the meeting.*
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 19. **WEBSITE:** *Example: www.abc.com*
 20. **FOOTER:** *Example: ABC Corporation, 123 Main Street, New York, NY 10001*

Abstract

[illegible][illegible][illegible][illegible][illegible][illegible]

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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Finding out about Forth

Keith and Steve Brain introduce the intricacies of Forth.

WITHOUT DOUBT FORTH must be the programming language for 1983 as the surely tell us that it is the best thing since sliced bread—and that no computer should be without it. Basic has been dethroned as that tired old lady of most languages while the virtues of this speed, flexibility and portability of Forth have been realized. And it seems that this ability to make intelligible codes on the subject of Forth is now an essential part of the repertoire of every computer user.

But does Forth really reach the parts other languages termed reach or is this just and fine example of the king's new clothes? That only you can decide in this article we will try to paper so that you can see the reality and start off by looking at how Forth operates.

The language is unusual in that it was developed originally by just one man, Charles H. Moore, as the answer to the deficiencies of Fortran and Algol. If you have tried to work out a logical derivation for the name Forth (as you have so many as it was really an accident). He wanted to call it Forth, as he thought of it as a fourth generation language. And the machine he was using only allowed two letter names so he just left the 'J' out.

It was initially designed as a control language for a laboratory and there are two primary dialects: Forth 79 and big Forth (the standard for Forth-Interact Group) which differ in a number of respects. The version most commonly implemented on micro is big Forth.

The official standards for both these Forth versions lay down certain minimum requirements, so that programs written in one dialect can easily be converted from one machine to another, provided that it does the same data.

Benefits

Individual commercial Forth packages differ in the ways that they use the available memory and in the extra facilities which have already been added for the benefit of the user. But we come back to the very error we've looked at the main part of the Forth code.

One of the major advantages of Forth is that programs are usually executed much faster than their Basic equivalents, but of course there has to be some penalty for the increase in speed. Forth is a more difficult language to master than Basic and it is not altogether user friendly.

As the whole fundamental concept of programming in Forth is so different to programming in Basic, you really need to

throw your ideas out of the window and start again. The experts extol the virtues of the structured nature of Forth, which they must help you write much better programs, but that only holds if you don't get lost trying up the wrong way before short-term it really means that you must sort out your ideas very thoroughly and that your programming will be more carefully planned.

As a Basic user you will think of programs being organized as statements placed one after which are executed in order except where loops, GOTO or GOSUB are encountered but Forth is not organized like that at all. It is built up from Forth words which are really just labels for different machine code subroutines which carry out particular single tasks. Every Forth system has a series of these words built in. For example the word '+' will cause two numbers to be added together.

If you want to do something more complicated than adding two numbers to you simply write several of the available words consecutively to make a complete program. All the words which are available to the user are contained in what is appropriately known as the dictionary in memory. When you first buy a Forth package this will only contain words pre-defined by the software supplier.

To be able to program in Forth you must understand how a stack works. Because most Forth operations involve the stack. Although people often find a default to keep the data of the stack there is really nothing complicated about it—it is simply an area of memory where numbers are temporarily stored. The stack operates on the last in first out principle and it is often visualized as a pile of plates.

The most important thing to remember is that numbers are always added to the top and that only the top number can be removed. If you only experience of dealing with plates is stacking them vertically into your microprocessor-controlled dishwasher then try the alternative 'last-in rule' on redundancy analogy.

Another major difference from Basic is that Forth operations use Reverse Polish Notation (RPN). If you want to add 2 and 4 on paper or in Basic you write 2 + 4. Here that the operator '+' is placed between the operands 2 and 4. In RPN this is written with the operator last.

24 +

This may seem rather odd to everyone used to the familiar 'make-to-put the operator in the middle' (unless they have battled with Hewlett-Packard calculators). But it is very logical for a stack-based system.

On this, adding-integer is a number which is calculated by being on the stack. In the example above the numbers 2 and 4 are pushed on to the stack and then '+' is added to the system to take the digits numbers from the stack and these together and then put the result back on top of the stack.

A whole series of other arithmetic operators are also provided in Forth. For example '*' is used for multiplication. [MAX] leaves the higher of two numbers on the stack and [MIN] leaves the lower of two numbers on the stack. If it is sometimes difficult to think of certain Forth words as operators as they look more like punctuation. For example, '[' puts another top number on the stack.

In addition to allowing you to add numbers to the top of the stack and remove them, Forth also contains words which allow you to copy and change the order of numbers on stack. For instance, [DUP] will duplicate the top number on the stack. [CROT] will swap the second number on to the top of the stack. [ROT] will delete the top number on the stack and [SWAP] will exchange the top two numbers on the stack.

If you combine these operations together you can soon get more powerful functions. Thus [DUP +] will double a number. [DUP *] will square it and [DUP * DUP +] will calculate 4 times the square between Forth words are absolutely essential and that missing pieces are one of the real sources of program bugs.

Fetching

Moving numbers in and out of memory locations is accomplished by the fetch and store instructions. The word '[+]' fetches a number from a specified location in memory and leaves it on top of the stack. Thus [300 +] will put the number at memory location 300 on top of the stack. Of course you will not see the number unless you add a print instruction. [300 +] [.] The opposite operation is fetch a store '[-]' which puts a number which is first put on to the stack into a specified memory location. Thus [300 300 -] will store the number 300 at the memory location 300.

If you want to find out what is in a memory location without loading the contents on to the stack you can use '[?]'. Thus [300 ?] will now display the 300 we just stored there. An extension of this is [DUMP] which will display a specified number of memory locations, starting from a defined point. These last two words are very useful when debugging.

There are many locations where a is useful to be able to copy whole blocks of data from one part of memory to another (for word and data processing) and that is done with MOVE and CMOVE, which require you to define a source address, a destination address and the number of items to be moved. Thus [300 500 50 MOVE] will copy 50 numbers from location 300 onward to 500 onward.

If you have followed the story so far you will perhaps have noticed that Forth does a lot of other high-level languages or may seem even more complicated.

4 and unintelligible than most. But we have not yet described the most advanced feature of Forth: its ability to define and compile your own words for new tasks which can then be added to the dictionary.

The only limitations on defining new Forth words are that they must be built up from existing Forth words (logical or user-defined) and that you must have enough space in the dictionary to hold them. It is the great flexibility which the introduction of new Forth words gives other languages.

In fact defining new words is one of the most operations in Forth. All you need to do is to place the name of the new word you want to define and the sequence of existing words to be followed between a colon and a semi-colon. For example: [SQUARE DUP] defines a new word SQUARE. Once this definition has been compiled then every time you use [SQUARE] the sequence [DUP] will be followed. Of course your new words can be much more complicated than this!

One of the main reasons Forth is faster than Basic is because Basic is an interpreted language but Forth is compiled. Of course the CPU can only actually work with machine code and all high-level languages must translate your instructions into a suitable form which the CPU can understand.

To illustrate the fundamental difference between a compiled and an interpreted language think of writing a program to test a kettle. First the Basic version:

```

10 PRINT "CHECK TAP"
20 FOR I=1 TO 10
30 IF LEVEL=LIMIT THEN
40 PRINT "OK"
50 KETTLE ON
60 IF TAP=0 THEN TAP=1
70 KETTLE OFF
```

When RUN the CPU goes to its own dictionary (the Basic interpreter) to find the meaning of PUT. If it is also compiled then it will jump to a corresponding machine code subroutine. In the ROM which it will use to set on the variables KETTLE and TAP. It now knows ON and goes through the whole process of interpretation once again, before it can set on the variable TAP.

Next it finds IF and <, which it takes up to find that it must compare the variables LEVEL and LIMIT and branch accordingly which one is higher. The execution of the program therefore proceeds in fits and starts all which involved is searched for in the interpreter and then added in at turn. This process of interpretation is gone through every time the program is run.

In Forth on the other hand you can define a new word: BOIL KETTLE [which contains all the instructions on how to boil a kettle, but nothing else. Initially you must define exactly how to boil the kettle but once you have got all the instructions together you can COMPIL them into a new word.

During this compilation process your instructions are converted into a new pseudo machine code sequence which is stored in memory. This machine code routine contains the complete instructions on how to boil the kettle which are now



Excerpts from Forth's dictionary

followed at high speed (with no need for interpretation), every time you call this word: BOIL KETTLE]

Putting up all the words in the Forth dictionary is done by [BLIST]. To get rid of an existing word you [FORGET] it. But this must be used with great care as it also deletes every other word above the defined word in the dictionary (or every word defined after the word you want to delete) due to the way the dictionary is organized (as if you forget to [FORGET] the old returns before you compile the new ones your dictionary stability is at risk).

Of course any new definitions you make will only be retained until you power down unless you save them on cassette or disk. Originally Forth was written to operate on a disk, and even the non-disk systems currently available for the Dragon operate using either RAM or simulated disks.

Rather than using the compiled version in the dictionary it is more useful to keep a copy of the source code; this complete definition as the you can modify it using an editor facility at a later date. Forth organizes source code on a series of numbered screens, but the details of these and the editor commands vary from one implementation to another. When you are satisfied with your source program you compile it into the dictionary using [LOAD]. Thus [LOAD] will compile the words on screen 2 and add them to the dictionary.

Basic equivalents

The Forth equivalent of the Basic FOR-NEXT control structure is the [DO] [LOOP] [which causes a given sequence of words to be executed a number of times. It increments the loop count by one with each execution: but [DO] [1+LOOP] increments by a specified number (otherwise STOP in Basic). An extension of the [DO] [LOOP] is [BEGIN] [UNTIL] which is really a [DO] [LOOP] of unspecified length which repeats until a flag on the stack becomes true.

Instead of the Basic IF THEN ELSE you have the slightly complicated [IF] [ELSE] [ENDIF] [where only the words between IF and ELSE are executed if the flag is true, and only the words after ENDIF are executed if the flag is false.

The main variations between different Forth implementations are in the new words which are provided and in the way the system is organized so that it

compares the rather different approaches at Dragonsoft, from Gauss Software and Teletext from Microval.

Dragonsoft seems to be aimed very much at the games and the market as the main features are designed to be graphics and the ability to access nearly all of the standard Basic commands in Forth. It is likewise something of a hybrid implementation which is particularly useful to the novice who can't face machine code but wants to use Forth to speed up his graphics programs.

The demonstration program on the release of the cassette gives some excellent examples, although we were surprised to find we could register to some of these almost as fast using Basic alone. Presumably the increase in speed was used because the calculations involved in these demo programs were very simple and because the actual movements were executed in a similar speed in both Forth and Basic, but higher speed gains should be achieved as the complexity of the calculations increases.

Text is organized into blocks of 256 bytes — its eight lines of 32 characters on 20 screens (giving a total of 512) so is the Dragon display. A standard Forth editor is included but the lack of a cursor is a fairly irritating omission. Basic statements are included by placing them in square brackets and these are also compiled: [GREET] is equivalent to PRINT and [JOYSTIN] to the relevant joystick coordinates.

The user manual is nicely produced and makes some attempt to explain how Forth operates, but regrettably a lengthy section of errors is included. In addition we found out the hard way that they were still a number of errors which had escaped notice!

Teletext is a modification of the Amiga-dio Colorfont for the Teletext Colour Computer and is rather more a Forth for the serious user. Text is organized into the more normal Forth pattern of 1024 byte blocks — as 16 lines of 64 characters on 16 screens (giving a total of 1024). Graphics are not supported directly but writing and modifying programs is much easier as there is a cursor and a full screen editor in place of a cumbersome line editor. In addition to the usual Forth words, output can be directed to the printer with P-ON and P-OFF, a feature which is really an essential and a cursor (level) could also be enabled (MPT ON and MPT OFF).

Teletext also provides the double number (32 bits) integers: [S DUMP] [S DUP] [and] [S SWAP] as well as the useful additional control structures: [CASE] — [ENDCASE] [and] [OF] — [ENDOF] (roughly equivalent to the Basic ON GOTO).

We have not covered the final version of the release, only the original Amiga-dio Colourfont version, as further modifications were still being made to the Dragon version. It is hoped that an interim standard will be the documentation for its Teletext word processor package then it should be first class. ■

Getting to grips with Dragon input and output

Jon Nicholson guides you through the Dragon's input/output memory locations, among the most important to be found in the memory map

THE ADDITIONAL INFORMATION book is supplied with the Dragon before the memory between FF00 and FF0F (noted unfortunately as input/output) inside the user might think there are 80 useful locations. But since each location serves eight lines there are only a total 10 — and four of these are reserved for future I/O enhancements. So there are only eight effective locations in the IO.

These eight locations control the keyboard, sound output, cassette play, video and screen modes, joystick control, printer control and timer update. It is quite clear that they are probably the most important in the whole memory map, and a thorough understanding of how the IO works is essential for anyone intent on mastering the Dragon machine language.

The IO is divided into three sections referred to as IO 0 (slow), IO 1 (fast), IO 2 (fast). Fast and slow refer to the speed at which the microprocessor accesses the IO when in the address dependent mode (PCORE00405 0). This is a very important point to remember since cassette input/output comes under control of IO 1 (fast) so if the 6502 is running in the fast mode then the cassette I/O will not function properly.

Four locations

Each IO is managed by a Peripheral Interface Adapter (PIA) though in the Dragon there is no PIA 2 because IO 2 is reserved for future enhancements. Each PIA takes up four memory locations: PIA 0 (FF00-FF03) repeated continuously to FF0F.

PIA 1: FF00-FF03 repeated seven times to FF0F.

But what is even more remarkable is that each PIA has six registers, four of which are assigned to two memory locations.

The PIA is really a double PIO (parallel input/output chip). And it has two ports, A and B. Each port has three registers, a data register, register a peripheral data register and a control register. These are assigned to the memory locations as shown in Figure 1.

Each register should be considered as 8 bits, with bit 7 being the most important. The contents of each register are examined by pointing to the relevant memory location and converting the contents to an 8-bit binary number. The then represents the contents of each bit of the register. Bits 0 through 7 reading from right to left. In the data direction register each bit 0 through 7 corresponds to data lines PA0 through PA7 (or PB0 through PB7). A 1 in a bit of this register means that that data line is programmed as an output. A 0 means that it is programmed as an input.

For an example of the data direction register has been selected and you pointed at FF00, you would get FF in decimal (255). This is represented by 11111111 in binary, which means that since bit 0 is 0, then data line PA0 is an input. Bits 1 through 7 are 1, so data lines PA1 through PA7 are outputs.

As already mentioned, the peripheral data register and data direction register share a common memory address, but obviously the computer can only access the contents of one register — which

register depends on the state of bit 0 of the control register. A 1 selects the peripheral data register. A 0 selects the data direction register. Pointing at the four control registers at FF00, FF01, FF02, FF03 returns 04, 05, 04, 07 respectively. This shows that the peripheral data registers have been selected in all four cases. This would seem terrible, since the computer has no way for the data direction register once it has programmed the various bits as input or output. The contents of the PIA on the other hand may be quite frequently changing.

Now more about that control register. This controls the functions that are either on or off — such as audio and cassette motor.

Can be started by memory (Figure 2) is in not so complicated as people think. Basically it is memory is a special sub routine, such as the triggering of a cassette to relay which the computer expects when it receives an interrupt request. When a signal to start from interrupt, it takes up from where it left off. An interrupt flag set to 1 indicates that an interrupt is requested. Interrupts can be disabled through setting a request is ignored.

So there are two control registers in a PIA (A and B). There will be four control lines. They are CA1, CA2, CB1, CB2. Now it will take a closer look at what each PIA does, starting with PIA 0.

Firing

If one selects the DOR A at FF00 and then points 0s returned indicating that all eight bits are set/output, as expected. Bit 0 through 7 indicate whether the joystick are being fired (Figure 3). A 0 in bit 0 indicates that the right joystick is being fired. A 0 in bit 1 indicates that the left joystick is being fired. A 0 in both bits indicates that both joysticks are being fired. A 0 in bits 0 through 3 indicates the row of keys (as connected on the circular board) containing the key being pressed. Bit 7 is the joystick comparator normally 1. It is only appears to be 0 when



the Peripheral Interface Adapter (PIA) chip

JOYSTICK is 0.

OPEN FILE FOR DRAGON USERS

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a printout if possible. We pay £5 for each bug-free program published, double for the program of the month. If you have any problems with the listings, please send your queries to the appropriate author, Dragon Unit, Mulhouse Court, 15 Whitcombe Street, London WC2B 9EP.

Lines

From W.J. Gerrard at Dragon at Bedford College TWO PROGRAMS use the line facility of the Dragon 32 in producing curves from a series of straight lines in exactly the same way as what is using string

or copper wire and held on a wooden frame.

In each of the programs the TD sets up the graphics mode and clears the high resolution screen. The FOR NEXT loops produce the series of lines required for the graph pattern and the final program line reads the display state until the BREAK key is depressed. Without this the display returns automatically to the TEXT

mode in the second example and so points out the unused portions of the screen.

Finally, after you have run one of the programs, press BREAK and type in RESET and press ENTER. More enter the following and run the program.

10 PMODE 4:1 SCREEN 1:GOTO 10
Run this. Then try altering the PMODE and SCREEN instructions in this program.

```
1 REM LINES BY W.J. GERRARD.
10 PMODE 4,1:SCREEN 1,0:PCLS
20 FOR X=0 TO 191 STEP 8
30 LINE(X+44,0)-(222,X),POINT
40 LINE(X+44,191)-(222,191-X),POINT
50 NEXT X
60 FOR X=191 TO 0 STEP -8
70 LINE(0,191-X)-(X,0),POINT
80 LINE(0,X)-(X,191),POINT
```

```
90 NEXT X
100 GOTO 100

1 REM LINES 2 BY W.J. GERRARD.
10 PMODE 4,1:SCREEN 1,0:PCLS
20 FOR X=192 TO 0 STEP -8
30 LINE(22,X)-(X+22,191),POINT
40 LINE(222,X)-(X+22,X),POINT
50 NEXT X
60 POINT(1,1):POINT(222,1)
70 GOTO 70
```

Scoring

From C. Stone at Oshorn

THIS PROGRAM CAN be used by any Dragon user to print a score routine on

the 1600 screen. When adding the routine to a program enter the listing from lines 10 to 300. Lines 300 and 350 should not be entered as they are only used to test the program. Lines 300 to 318 are the words of the program and are entered whenever a program needs a score, and a score update.

Variables

N5=Data for drawing numbers
N6=Data for drawing numbers
N7=Data for drawing scores
A=Units counter
A1=Thousands counter
A2=Hundreds counter
Lines 300-350 test the program

```
10 REM*****
20 REM: C > C.W. STONE, 199349
30 REM*****
40 CLEAR:000
50 DIM N5(11)
60 REM*****
70 REM DEFINE DATA
80 REM*****
90 N5(0)="C10H+0,-1FR2DUH4,2G4"
100 N5(1)="C10H+0,-1G0G5"
110 N5(2)="C10H+4,-1G4,4U2DU2H4,2G"
120 N5(3)="C10H+0,-1FR2DUH4,2G4,2G"
130 N5(4)="C10H+3,0,0G23R4"
140 N5(5)="C10H+0,-1FR2DU2H4,3G2R4"
150 N5(6)="C10H+0,-2G22F4G1,2H4,2H2F"
160 N5(7)="C10H+2,-1G0G2DU2L4"
170 N5(8)="C10H+1,-1G2DU2H4,2H4,2G2F4,2G2F"
180 N5(9)="C10H+0,-1FR2DUH4,2G4,2G4"
190 REM*****
200 REM END "BLACK NUMBER"
210 REM*****
220 B4="C000+0 -0R260 IL260 1R260 IL260 UR260 IL260 1R260"
230 REM*****
```

Continued on page 42

```

240 REM SB="SCORE"
250 REMXXXXXXXXXXXX
260 SB="C10M+0.-1FR2DH4SF2FSH+4.+0H0H02PHL2G04FR2DH+4.+1R2G04HL2G04FPH+5.+0H0P
3F0C13F2SH+4.+0P4L403R44U3F4DS+4.+0P4SH+0.-2L4"
270 REMXXXXXXXXXXXX
280 REM DRAW NUMBERS
290 REMXXXXXXXXXXXX
300 PPOS4,1 SCREEN1,1 POLS
310 REM=1
320 IFP0-9THEN A1=A1+1 A=0
330 IFP1-9THENH2=H2+1 H1=0
340 IFP2-9THEN P0=P0 A1=0 A=0
350 DRAWPH225,10*H0P2 H="H232,10*H0P2)+*H235,10*H0P2)
360 DRAWPH225,10*H0P
370 DRAWPH225,10*H0P
380 GOTO510

```

Space Race

From Above Down in Lujan
THIS IS AN invaders-type game in which
you have to shoot all the boats before your
fuel runs out. The more stars you shoot
the faster your fuel is used up. The

instructions are contained in lines 270-
720. Lines 75-190 set up the variables.
195-270 draw the screen. 280-380 are the
main movement routines and 400-600 are
the end-of-game routines.

```

10 "SSPACE" WPOS...B1...R, DOWEY
20 CLS PRINT"DO YOU WANT INSTRUCTIONS? Y/N,"
30 PB="NO" IF PB="Y" AND PB="Y" THEN 30
40 IF PB="Y" THEN GOSUB50
50 FOR40400,0
60 K=0
70 D=0
80 CLS
90 "
100 T1=0 T=0 T1=0 T1=0
110 R=1024
120 HTS=1
130 B=0
140 SCORE=0
150 G=0400
160 FORK=0 TO 27 STEP4
170 R=1024
180 FORI=0 TO200 STEP 32
190 FORG=1,100
200 NEXTI
210 FORI=320 TO 456 STEP 32
220 FORG=1,100
230 NEXTI
240 FORY=64 TO 320 STEP 64
250 FORX=X+Y,145
260 FORH=X+Y+1,150 FORG=X+Y+2,150
270 NEXTY NEXTX
280 "XXXXXXXXXXXXXXXXXXXX
290 T1=T1+1
300 B=1+0P4
310 IFB=12 THEN B1=-1
320 IFB=10 THEN B1=1
330 IF B=1 THEN FORK SHOT,120
340 IFB=1 THEN SHOT=SHOT+32
350 IF SHOT=0 THEN P=0
360 IF K=0 THEN 380
370 IF P=0 THEN SHOT=32=155 THEN FORKSHOT=32,120 FORKSHOT=32,120 FORK SHOT=34,120 FOR
380 SHOT=31,120 K=0 PLAY"1250000" SCORE=SCORE+20
390 IF P=0 THEN SHOT=32=145 THEN FORK SHOT=32,120 FORK SHOT=34,120 FORK SHOT=36,120
400 PLAY"1250000" P=0 SCORE=SCORE+20
410
420 PRINT400,"SCORE " SCORE " ", SCORE40,1
430 GOSUB40,1
440 IF SCORE=1000 THEN 570
450 IFK=1 THEN FORK SHOT 380
460 IFB="Y" AND K=0 THEN SHOT=G-32 K=1
470 G=0
480 IFG=510=32 THEN G=H30=32
490 IF G=H=440 THEN G=H=400

```

```

400 IF CL=1 THEN POREC=H1.120
410 IFCL=1 THEN POREC=2.120
500 POREC.231=POREC+1.220
510 TJ=TE+CB-9000:TF=F(X,TJ)
520 IFTF=1 THEN 500
530 TL=K
540 POREC=20+20*TL.130
550 IF TL=15 THEN 400
560 GOTO200
570 CO=CO+1
580 POREC.120=POREC+1.120
590 GOTO500
600 CL00 PRINTB204,"PLANET DESTROYED, HARD LUCK", SCOR00.1
610 PRINTB204,"TOTAL SCORE ",SCOR00-SCOR00.
620 WD=0041000+80:IFH00H1 THEN WD=40
630 PRINTB200,"40-80000 IS "WD
640 PRINTB404,"PRESS KEY "P".
650 SCOR010.1
660 IF INKEY="P" THEN GOTO 50 ELSE 600
670 CL01
680 PRINTB204,"THIS IS AN ADVERSARY TYPE GAME IN WHICH YOU HAVE TO SHOOT AL
THE ALIENS BEFORE YOUR FUEL RUNS OUT, THE MORE ALIENS YO
U SHOOT THE FASTER YOUR FUEL IS USED UP."
690 PRINT-PRINT"THE KEYS ARE 'Z' AND A FIRE"
700 PRINTB400,"PRESS A KEY TO PLAY"
710 IF INKEY="" THEN710
720 RETURN

```

Brick Out

From Paul Hill in *Stevenson*

USE YOUR SKILL to break down the wall. Please note that PORE 65485 I has been used to speed up the ball. If your machine will not run then delete line 660. Also do not break the game until the computer asks "Another game yes or no" as the

game will also be possible without work-
ing. The listing was printed using a Colour
Graphics Printer 100.

Program notes

Lines
80-130 Set up
140-240 Ask if joystick or arrow keys
are required
250-320 Instructions of game
330 Play a tune
340-650 Brick wall and score routine

660-750 Start of main loop and placing
of the ball
760-800 Ball position X and Y
800-850 Convert X and Y to PRINT()
1000-1050 Remove brick and play
routine
1100-1150 Random bounce
1160-1180 Check if all bricks are re-
moved and update an score
1170-1200 New game start
1240-1270 Game over display routine and
fin score

```

10 P BRICK OUT
20 P
30 P 4 BY P HILL &
40 P 17-4-83
50 P 16160 N 00P-115
60 P -----
70 P SET UP.
80 H1=0:P=0:CLS
90 FOR J=0 TO 3:
100 G=0:G=128:
110 G=0+64
120 NEXT J
130 D1=0:001125+0+0001185+0+0001185
140 P -----
150 PRINTB2, BRICK OUT:
160 FOR N=0 TO 80
170 PRINTB0, " = SOUND 50,2
180 NEXT N
190 PRINTB134,"WASH WILL YOU LOSE -"
200 PRINTB134, JOYSTICK(1) OR ARROW KEYS
"2".
210 PRINTB000, ENTER ", INPUT JA
220 IF JA=2 THEN 100
230 IF JA=1 THEN F=1
240 IF JA=3 THEN F=2
250 CLS
260 PRINTB00, USE YOUR SKILL TO REMOVE A
LL".
270 PRINTB130,"THE BRICKS ",
280 PRINTB134, FOR EACH BRICK HIT YOUR S
CORE) :
290 PRINTB200,"WILL BE INCREASED BY "J
300 PRINTB022, 10 POINTS
310 PRINTB450, PRESS A KEY TO START,".
320 M=0:G=70:IF M=1 THEN 320
330 G0000 1250
340 CLS:G=115+0+51+0
350 PRINTB2, score ",CH00128:G1,
360 PRINTB13,"N",CH00128, score",H1,
370 P -----
380 G0000 330-GOTO 650
390 " BRICKS & WALL SUBROUTINE
400 FOR N=32 TO 62 STEP 2
410 PRINTB0,CH001185,
420 NEXT N
430 FOR N=32 TO 62 STEP 2
440 PRINTB0,CH001185,
450 NEXT N
460 FOR N=64 TO 84 STEP 2
470 PRINTB0,CH001250,
480 NEXT N
490 FOR N=85 TO 95 STEP 2
500 PRINTB0,CH001185,
510 NEXT N

```

Continued on page 44

```

528 FOR N=96 TO 125 STEP 2
530 PRINTN,CHR(155),
540 NEXT N
550 FOR N=97 TO 127 STEP 2
560 PRINTN,CHR(155),
570 NEXT N
580 FOR N=128 TO 158 STEP 2
590 PRINTN,CHR(155),
600 NEXT N
610 FOR N=129 TO 159 STEP 2
620 PRINTN,CHR(155),
630 NEXT N
640 FOR N=160 TO 190 STEP 30
650 PRINTN,CHR(155),
660 PRINTN(1),CHR(155),
670 NEXT N
680 RETURN
690 '-----
700 X=1 Y=1:W=H=32767:Z=F=H=15
710 ' LOOP
720 ' KEY OR JOYSTICK MOVEMENT
730 IF F=1 THEN X=X+JOYX(16),Y=Y+JOY
740
750 IF F=2 AND PEEK(343)=223 THEN X=X
1-1F X=X THEN X=X
750 IF F=2 AND PEEK(343)=223 THEN X=X
1-1F X=X THEN X=X
760 PRINTW=40,X,Y,
770 PRINT R=300,X,Y,3,27=300,
780 PRINTW=45,LEFT(16,X),Y,
790 '-----
800 ' BALL POSITION X & Y
810 X=X+JOYX(16):Y=Y
820 IF X=0 THEN X=1
830 IF X=255 THEN X=1
840 IF Y=0 THEN Y=1
850 IF Y=255 THEN G=1:PLAY L=8000F=5000
1F G=0 THEN 1200 ELSE 700
860 SETX,Y,G
870 IF POINTX,Y=2 THEN S1=S1+10:GOTO
900
880 IF POINTX,Y=8 THEN S1=S1+10:GOTO
900
890 IF POINTX,Y=5 THEN PLAY L=8000:Y=Y
1
900 POKE 65496,1-'SPEED UP!!
910 RESETX,Y
920 GOTO 710

```

Loading hex

From Peter Barry in Personal
 (1816) is a simple method of loading hexadecimal numbers directly into memory. The program listed is a short assembly code routine for an Altair/Int. an assembly program. It also should happen that a simple 16-bit 32754 will bring the program back. The routine will not work if you type in a new hex line or define a new variable before restoring the old program.

```

10 CLEAR 200,32753
20 DATA 9E,19,8D,83,F3
30 DATA 30,02,9F,1B,9F,1D,9F,1F,39
40 FOR I=0TO13
50 READ A$:A$="&H"+A$
60 POKE 32754+I,VAL(A$)
70 NEXT I

```

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Liverpool 1

Dragon Code — 10000 code characters
and many programs. Send £3.00 +
postage to Hobhouse Court, Hobhouse,
Gwent
Send £10.00 to SWS, 73 Long Street,
Liverpool 1

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

10-15	16-20	21-25	26-30
31-35	36-40	41-45	46-50
51-55	56-60	61-65	66-70
71-75	76-80	81-85	86-90
91-95	96-100	101-105	106-110
111-115	116-120	121-125	126-130
131-135	136-140	141-145	146-150

I make this _____ words, at 20p per word so I owe you £_____

Name: _____

Address: _____

Telephone: _____

Please cut out and send this form to: Classified Department, Dragon User, Hobhouse Court, 19 Whitehorn
Street, London WC2E

SPECIALLY FOR THE DRAGON USER
2 books from Sunshine

[illegible][illegible]

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Please send me: ☐ the Marketing Manager ☐ Director of Finance/Operations

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Figure 1

1000

MACE
EDITOR / ASSEMBLER / MONITOR
by Robert Toot



DRAGON 32 CARTRIDGE

£ 29.95

REPLACES OF THE 1.0 EDITION
WITH A NEW: ADDITION

STANDARD FORM NO. 64					
OFFICE OF THE SECRETARY OF DEFENSE	DATE	BY	FOR	BY	FOR
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Bugs for no reason

If I may be allowed to expand on your article I have a couple of questions on the Dragon.

First, if the computer is waiting for an input and is left for 10 minutes or more, the program develops a bug and is consequently lost. This is most frustrating if the program is home grown and no hard-copy has been made.

Secondly, when making a program or just running one bugs appear for no reason. One of the PDP-11 authors does not help. His suggested house-keeping and storage combinations of letters and figures appear on the screen. Any ideas?

C. Moulder
Plymouth
Devon

First, third problems you have described are most probably fixed in the software. As mentioned in the answer to a similar query in the May issue of *Dragon* (see you should first check whether there are tape fluctuations in the reader power supply operating with the reader), if this is the case a good filter may be required.

Also check whether the speed-up factor is used in any of the programs as this will generally give a similar effect or cause the machine to lock up.

If, on affecting both these points, neither can be seen to be causing the problems, you should return the machine to the origin of dealer for testing.

Other languages

I HAVE several Dragon computers for two machines and am very pleased with it.

I have seen another language which is said to suit with my machine. It is both in Spanish and tape form, although not developed with the (Basic) used with the Dragon. I would like to know if there are any real advantages in using this new language.

Simon Webster
Widgeway
Somerset

THE MOST obvious advantage of Porth over your existing Basic is that it runs a full BASIC. Once familiar with the language you should also find it easier to write



programs, and they should also be easier to debug.

Dragon Basic will be marketing a version of Porth on cassette which will allow you to access Basic

a detailed portrait of the Dragon 32 memory map.

C. Moulder
Plymouth
Devon

Keyboard grievances

As the owner of a Dragon 32 computer which I have passed on for the moment, I am pleased with its overall performance, having said this, however, I have two small grievances: the size of the screen display and the lack of response from the other keyboard.

On the chips containing the screen display for expansion with those for another machine? And do you know of any manufacturer who produces a quality keyboard into which the gaps of the Dragon might be incorporated with a few alterations?

Norman Reeve
Cym
Aberystwyth

I AM AFFRONT I can't help you with either of your questions. The chips can't be replaced, but cartridges for 32 by 32 display are available. The Dragon's keyboard is not as the other equipment completely as the Dragon, and I don't know of anybody offering alternatives.

Memory details

I AM a 16th year student at Millership School, currently embarking on the Youth Enterprise Scheme, at which I plan to sell computer software.

I would be very grateful if you could advise me where I can find

WHERE THERE is a basic memory map provided in the additional information appendix in the *Dragon* manual, this is not always extensive enough for many users such as yourself.

Dragon Basic now has a built-in called information for machine code users which is available on request. This built-in gives a more detailed map of any map and some useful functions for those interested in machine code. Also included in the booklet are details on memory for and joystick connections which have proved useful to many users.

Graphics with text

AS EVERYONE is aware, it is not supposed to be possible to print text on a high resolution screen on the Dragon, although I have of course read several methods of drawing characters including the excellent article by David Lamb.

However, the highest resolutions take up four pages, which are in the serial Basic across the screen. It occurs if it is possible to display only three pages using the bottom quarter of the screen for options in normal text. It sounds feasible but I can't work out how to do it.

J. W. Hain
Moulton
Northants

UNFORTUNATELY it is not possible to mix text and graphics due to the fact that the text graphic mode is controlled by bit 7 of SP42. Therefore, as

there is only one control bit, it selects either graphics (bit 7 set) or text (bit 7 clear).

Saving with hex

I HAVE been using the Tandy manual's *Getting started* and *Going ahead with Colour Drive*. On a Tandy it seems possible to *SAVE* using hex addresses as opposed to decimal. I could not make this work. Can you tell me if it can be done? This is the example given: a 45 00 00. If it can't be done, do you know why?

Patricia Mansfield
Lawton Road
Abinger

IF it is possible, it is not in the *SAVE* command with hex addresses on the Dragon 32. All hexadecimal numbers should be preceded by an *0H* to indicate that the following alphanumeric is a hexadecimal number.

Therefore, the example you have asked should read *SAVE* 04H 00H 00H, where 04H specifies the start address in memory. 00H represents the end address and finally 00H represents the output address.

POINT problems

I HAVE had a Dragon 32 now for six months and during this time two major problems have been causing my attempts to write programs. I can't get either the *POINT* or *POINT* command to work.

St. Peters
Devon
Exeter

THE *POINT* and *POINT* commands may be fixed with the following values:

POINT 10 C10 3
30 *POINT* 10 10 10 10
POINT 10 *POINT* 10 10 10 10
10
30 *POINT* 10
30 *POINT* 10
POINT 10 10 10

These values should give you the value 3 on the screen.

If you Dragon does not give the correct address you should return it to the original dealer for testing.

Put robot power on your Dragon

Gordon Lee tests your skill at solving alphametics — Powertran provides the prizes

ONE OF THE oldest types of mathematical puzzle is the cryptarithm in which letters are substituted for digits, and the solver has to discover the original values. Try the example:

$86056 + 4 = 86060$

The answer is $21878 + 4 = 87952$

In 1935 J A H Hunter invented the first cryptarithms that actually formed logical sentences. We now have that:

$STARS + RARE = TREAT$
 $FOUR + FIVE = EIGHT$

(the alphametic is correct even if the sum isn't!) — or even

$DELLAR + MURDER + CLEVER = CLEARED$

The numeric equivalents of the above alphametics are

$85558 + 6581 = 92139$
 $6037 + 5591 = 11628$ and
 $10093 + 863735 = 1004828$

In fact the second of the three puzzles has conventional arithmetic solutions and you might like to find them.

This month's competition question is also in the form of an alphametic. Let me set the scene. I bumped into Alan the other day outside the Intelligence. Just before my magazine he announced showing me a copy of Dragon User, and also one of those word puzzle books.

You seem to be getting on line with your new Dragon, I remarked. But I don't know that you were interested in word puzzles as well. Here's something for you to try that combines the two.

I sketched out the following alphametic based on the words DRAGON LOVER.

DRAGON

What you have to do, I explained, is to substitute digits for letters — each different letter standing for a different digit.

I too, realised Alan was reaching his head. And also both DRAGON and LOVER are perfect squares. I called after him as he walked away.

Later that day the phone rang. It was Alan. About his puzzle, he said. I've been working on it and it seems that there are a number of possible alternatives.

Well, I replied, if the answer I had in mind, the word DRAGON represents my



Prize

THIS MONTH, this month is a Maragrap robot from Powertran Electronics, including all the necessary peripherals.

Rules

SO WITH THE robot, you have to send in the most elegant solution to the puzzle. You must show how the computer can be solved with the use of a Mars program developed on your Dragon 32 computer.

As a tip (taken) complete the following sentence in 15 words or less:

phone number, and you've just dialled it.

A few minutes later the phone rang again. I had given enough information. Interrupted Alan gleefully.

Well, let's say that the number represented by the letter D is the same as my house number. As Alan knew my address he was able to solve the problem instantly. Can you?

May winner

IN THE May competition the number of terms needed to exceed each successive integer is

234, 3415, 4211, 5482, 66271, 76165, 81874, 94550, and 10123371

Note that if the number of terms needed to exceed each integer is divided by the number of terms required to exceed the next smallest integer the result — as the above programme — converges on 2.718281828 — the constant e.

The author is Gordon Haines of Middlesex, though who will be receiving his prize of a printed and word processing package from Microsoft.

I want to add a robot to my Dragon in 1983.

Your entry must arrive at Dragon User by the last working day in July 1983. The name of the winner, and the solution to the puzzle, will be printed in the September issue of Dragon User. You may only enter the competition once. Entries will not be acknowledged and we cannot enter a correspondence of the result.

Please send your entries to Competition Corner, Dragon User Magazine, Court 19 Whitehall Street, London WC2 7HP.





**DRAGON 32
OWNERS**
Shoot your
mouth off
in...

Talking Android Attack

Another great game from Microdeal the first of a new generation of fast action, talking arcade games. At the start of each frame the computer warns the androids of an intruder "Intruder Alert!" Now you can either run for the nearest doorway, escape and be called a "Coward" or chase, shoot and try to wipe out the androids, however, if you hit one it will turn into a GHOST ANDROID, capable of wandering free with — which of course are electrified with a fatal effect on you when touched!! Should you clear the screen the computer sneers, "I'll get you next time". WTS 10

All Cassettes £8 each

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